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TRANSACTIONS

OF THE

COLLEGE OF PHYSICIANS

OF

PHILADELPHIA

THIRD SERIES

VOLUME THE FORTY-FIRST

PHILADELPHIA
PRINTED FOR THE COLLEGE
1919

NOTICE

The present volume of TRANSACTIONS contains the papers read before the College from January, 1919, to December, 1919, inclusive.

The Committee of Publication thinks it proper to say that the College holds itself in no way responsible for the statements, reasonings, or opinions set forth in the various papers published in its TRANSACTIONS.

EDITED BY

H. R. M. LANDIS, M.D.

"This volume is published in part by the income from the Francis Houston Wyeth Fund"

DORNAN, PRINTER

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1818	THOMAS PARKE
1835	THOMAS C. JAMES[1]
1835	THOMAS T. HEWSON
1848	GEORGE B. WOOD
1879	W. S. W. RUSCHENBERGER
1883	ALFRED STILLÉ
1884	SAMUEL LEWIS[2]
1884	J. M. DA COSTA
1886	S. WEIR MITCHELL
1889	D. HAYES AGNEW
1892	S. WEIR MITCHELL
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1910	GEORGE E. DE SCHWEINITZ
1913	JAMES CORNELIUS WILSON
1916	RICHARD H. HARTE
1919	WILLIAM J. TAYLOR

[1] Died four months after his election.
[2] Resigned on account of ill-health.

FEB 11 1921
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1919

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Clerk, H. R. M. LANDIS, M.D.

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Clerk, WALTER G. ELMER, M.D.

* Deceased.

FELLOWS

OF THE

COLLEGE OF PHYSICIANS OF PHILADELPHIA

DECEMBER, 1919

* Non-resident Fellows.
† Fellows who have commuted dues.

ELECTED

1912. Addison, William H. F., A.B., M.D., Professor of Normal Histology and Embryology in the University of Pennsylvania. Medical Laboratories, University of Pennsylvania.

1905. Adler, Lewis H., Jr., M.D., Professor of Diseases of the Rectum in the Philadelphia Polyclinic and College for Graduates in Medicine; formerly Prosector to the Professor of Anatomy in the University of Pennsylvania; Consulting Surgeon to the Charity Hospital. 1610 Arch St.

1914. Aiken, Thomas Gerald, M.D., Assistant Visiting Physician to the Chester County Hospital, West Chester, Pa.; Pathologist to the Country Branch of the Rush Hospital for Tuberculosis. Berwyn, Pa.

1913. Alexander, Emory G., M.D., Surgeon to St. Christopher's Hospital for Children; Associate Surgeon to the Episcopal Hospital; Clinical Professor of Surgery in the Woman's Medical College of Pennsylvania, and Demonstrator of Fracture Dressings in the Jefferson Medical College; Assistant Surgeon to the Kensington Hospital for Women. 1627 Oxford St.

1903. Allen, Alfred Reginald, M.D., Lecturer on Neurological Electrotherapeutics and Instructor in Neurology and Neuropathology in the University of Pennsylvania. 2013 Spruce St.

ELECTED

1906. Allen, Francis Olcott, Jr., A.B., M.D., Surgeon to the Presbyterian and the Children's Hospital; Assistant Surgeon to the Bryn Mawr Hospital; Surgeon to the Out-patient Department of the Pennsylvania Hospital. 2216 Walnut St.

1896. Allyn, Herman B., M.D., Associate in Medicine in the University of Pennsylvania; Physician to the Philadelphia General Hospital. 501 S. Forty-second St.

1888. Anders, James M., M.D., L.L.D., Professor of Medicine and Clinical Medicine in the Medico-Chirurgical College; Officer de l'Instruction Publique. 1605 Walnut St.

1905. Anspach, Brooke M., M.D., Associate in Gynecology in the University of Pennsylvania; Gynecologist and Obstetrician to the Philadelphia General and the Stetson Hospitals; Assistant Gynecologist to the University Hospital; Attending Gynecologist to the Bryn Mawr Hospital. 1827 Spruce St.

1905. Appleman, Leighton F., M.D., Demonstrator of Pharmacy and Materia Medica, and Instructor in Therapeutics in the Jefferson Medical College; Associate Professor of Ophthalmology in the University of Pennsylvania Graduate School of Medicine; Assistant Surgeon to the Wills Eye Hospital; Ophthalmologist to the Frederick Douglass Memorial Hospital and to the Burd School. 308 S. Sixteenth St.

1906. Ashhurst, Astley Paston Cooper, A.B., M.D., Instructor in Surgery in the University of Pennsylvania; Surgeon to the Episcopal Hospital and to the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases. 1629 Spruce St.

1893. Ashton, Thomas G., M.D., Physician to the Philadelphia General Hospital. 1814 S. Rittenhouse Square.

1914. Austin, J. Harold, B.S. (Univ. of Penna.), M.D., Department of Research Med., University of Pennsylvania. Ardmore, Pa.

1906. Babbitt, James A., A.B., (Yale), A.M. (Haverford), M.D., Professor of Hygiene and Physical Education at Haverford College; Assistant Laryngologist and Aurist, and Chief of the Out-patient Department for Diseases of the Nose, Throat, and Ear at the Lankenau Hospital; Assistant Instructor in Otology in the University of Pennsylvania; Laryngologist to the Out-patient Department of the Children's Hospital. 1901 Chestnut St.

1910. Baer, Benjamin F., Jr., M.D. 2040 Chestnut St.

ELECTED

†1892. Baker, George Fales, B.S., M.D. 1818 Spruce St.

1911. Baldwin, James Harvey, A.B., M.D., Assistant Surgeon to the Methodist Hospital. 1426 Pine St.

1889. Baldy, John Montgomery, M.D., Professor of Gynecology in the Philadelphia Polyclinic; Surgeon to the Gynecean Hospital; Consulting Surgeon to the Jewish and the Frederick Douglass Memorial Hospitals. 2219 De Lancey Place.

1916. Balentine, Percival L., M.D., Assistant Surgeon, Wills Eye Hospital; Demonstrator of Ophthalmic Surgery in the Philadelphia Polyclinic. 302 Weightman Building, 1524 Chestnut St.

1898. Balliet, Tilghman M., A.M., M.D., Professor of Therapeutics at Dartmouth College, Hanover, N. H.; Physician to the Old Man's Home. 3709 Powelton Ave.

1911. Barnard, Everett P., M.D., Obstetrician to the Maternity Hospital; Assistant Instructor in Obstetrics in the University of Pennsylvania. 119 S. Nineteenth St.

1883. Baum, Charles, A.M., M.D., Ph.D. 1828 Wallace St.

1908. Beardsley, Edward J. G., M.D., L.R.C.P. (Lond.), Assistant Professor of Medicine in the Jefferson Medical College; Chief Clinical Assistant in the Out-patient Medical Department of the Jefferson Medical College Hospital; Assistant Physician to the Jefferson Hospital. 258 S. Sixteenth St.

*1916. Bell, William Hemphill, M.D., Captain, Medical Corps, U. S. Navy, U. S. Naval Operating Base, Hampton Roads, Va.

*1874. Bennett, W. H., A.M., M.D., Physician-in-Charge of the Seashore House for Invalid Children, and of the Seaside House for Invalid Women, Atlantic City; formerly Physician to the Episcopal Hospital, and Physician-in-Charge of St. Christopher's Hospital for Children. Children's Seashore House, Atlantic City, N. J.

1896. Beyea, Henry D., M.D., Associate in Gynecology and Assistant Demonstrator of Obstetrics in the University of Pennsylvania; Assistant Surgeon to the Gynecean Hospital. 1734 Spruce St.

*1903. Biggs, Montgomery H., M.D., Surgeon to the Rutherford Hospital; Chief Surgeon of the Carolina, Churchfield and Ohio Railway. Rutherfordton, N. C.

1918. Billings, Arthur E., M.D. 252 S. Sixteenth St.

1917. Birdsall, Joseph C., A.B., A.M., M.D., Urologist, Polyclinic Section of the Medico-Chirurgical College and Hospital

ELECTED

Graduate School of Medicine of the University of Pennsylvania; Chief of the Genito-urinary Dispensary and Assistant Genito-urinary Surgeon, Presbyterian Hospital; Instructor in Surgery, University of Pennsylvania. 3459 Chestnut St.

1908 Bland, Pascal Brooke, M.D., Chief Clinical Assistant in the Gynecological Department of the Jefferson Medical College Hospital; Instructor in Gynecology in the Jefferson Medical College; Gynecologist to St. Joseph's Hospital; Assistant Gynecologist to the Philadelphia General Hospital. 1621 Spruce St.

1917. Block, Frank B., M.D., Surgeon to the Jewish Hospital; Assistant Instructor in Gynecology in the University of Pennsylvania Medical School. 2035 Chestnut St.

1894. Bochroch, Max H., M.D., Neurologist to the St. Joseph's and Jewish Hospitals; Physician to the Psychopathic Wards of the Philadelphia General Hospital. 1539 Pine St.

1896. Boger, John A., A.M., M.D., Surgeon to St. Mary's Hospital; Surgeon to the Stetson Hospital; Surgeon to the Dispensary of the Episcopal Hospital. 2213 N. Broad St.

1910. Boice, J. Morton, A.B., M.D., Gynecologist to the Outpatient Department of St. Joseph's Hospital. 4020 Spruce Street.

1911. Bonney, Charles W., A.B., M.D., Associate in Topographic and Applied Anatomy in the Jefferson Medical College. 1117 Spruce St.

1913. Boston, L. Napoleon, A.M., M.D., Professor of Physical Diagnosis in the Medico-Chirurgical College; Physician to the Philadelphia General Hospital; Pathologist to the Frankford Hospital. 1819 Chestnut St.

1919. Bowen, David Ralph, M.D. 235 S. Fifteenth St.

1891. Boyd, George M., M.D., Professor of Obstetrics, Graduate School of Medicine, University of Pennsylvania; Obstetrician and Gynecologist to the Philadelphia Lying-in Charity; Obstetrician to the Medico-Chirurgical Hospital; Gynecologist to the Polyclinic Hospital. 1909 Spruce St.

1907. Boyer, Henry Percival, M.D., Neurologist to the Stetson Hospital; Physician to the Philadelphia Home for Incurables; Assistant Physican to the Orthopædic Hospital and Infirmary for Nervous Diseases. 4602 Baltimore Ave.

1907. Bradley, William N., Ph.G., M.D., Visiting Pediatrist to Howard Hospital; Visiting Pediatrist to Philadelphia General Hospital; Instructor in Pediatrics in the University of Pennsylvania. 1725 Pine St.

ELECTED

1903. Branson, Thomas F., M.D., Attending Physician to the Bryn Mawr Hospital. Rosemont, Pa.

1891. Brinton, Lewis, M.D., Physician-in-Chief to the American Hospital for Diseases of the Stomach. 1301 Medical Arts Bldg., Sixteenth and Walnut Sts.

1900. Brinton, Ward, A.M., M.D., Visiting Physician to the Tuberculosis Department of the Philadelphia General Hospital; Visiting Physician to the Hospital for Poor Consumptives at White Haven, Pa.; Visiting Physician to the Philadelphia Jewish Sanatorium for Consumptives. 1423 Spruce St.

1917. Bromer, Ralph S., A.B. (Yale University), M.D., Roentgenologist to the Episcopal and the Orthopedic Hospitals. 1629 Spruce St.

1907. Brooks, Macy, A.B. (Princeton), M.D., Assistant Genito-urinary Surgeon to the Philadelphia General Hospital. 1321 Spruce St.

1919. Brown, Henry P., Jr., M.D. 1822 Pine St.

1916. Brown, Samuel Horton, M.D. 1901 Mt. Vernon St.

1887. Brubaker, Albert P., A.M., M.D., Professor of Physiology and Medical Jurisprudence in the Jefferson Medical College; Professor of Physiology and Hygiene in the Drexel Institute of Science, Art, and Industry. 3426 Powelton Ave.

1916. Buckley, Albert Coulson, M.D., Medical Superintendent, Friends' Hospital, Frankford; Associate Professor of Psychiatry, Graduate School of Medicine, University of Pennsylvania; Alienist to the Orthopædic Hospital and Infirmary for Nervous Diseases. Frankford, Phila.

1906. Burns, Stillwell C., M.D., Associate Professor of Surgery in the Graduate School of Medicine, University of Pennsylvanian. 1925 Spring Garden St.

1892. Burr, Charles W., M.D., Professor of Mental Diseases in the University of Pennsylvania; Neurologist to the Philadelphia General Hospital. 1918 Spruce St.

1906. Butler, Ralph, M.D., Professor of Diseases of the Nose and Throat in the Philadelphia Polyclinic and the College for Graduates in Medicine; Chief of the Dispensary for Diseases of the Ear at the University Hospital; Assistant Professor of Otology in the University of Pennsylvania; Laryngologist and Aurist to the Lankenau Hospital. 1926 Chestnut St.

ELECTED

*1908. Cadbury, William W., A.M., M.D., Canton Christian College, Canton, China.

†1907. Cadwalader, Williams B., M.D., Instructor in Neurology and Neuropathology, University of Pennsylvania, School of Medicine; Neurologist to the Presbyterian Hospital; Consulting Neurologist to the Bryn Mawr Hospital. 1501 Spruce St.

1905. Cameron, George A., M.D., Physician to the Germantown Hospital. S. E. cor. Schoolhouse Lane and Greene St., Germantown.

1905. Carmany, Harry S., M.D., Surgeon to St. Timothy's Hospital, Roxborough; Associate Surgeon of the Episcopal Hospital; Surgeon to the Dispensary of the Episcopal Hospital. 366 Green Lane, Roxborough.

1910. Carnett, John Berton, M.D., Associate in Surgery in the University of Pennsylvania; Assistant Surgeon to the University of Pennsylvania Hospital; Surgeon to Philadelphia General Hospital. 123 S. Twentieth St.

1905. Carpenter, Herbert B., M.D., Physician to the Dispensary of the Children's Hospital. 1805 Spruce St.

1895. Carpenter, John T., M.D., Attending Ophthalmologist to the Bryn Mawr Hospital. 2030 Chestnut St.

1917. Carson, John B., M.D. 348 S. Sixteenth St.

1892. Cattell, Henry W., A.M., M.D. 3709 Spruce St.

1900. Chance, Burton, M.D., Attending Surgeon to the Wills Eye Hospital; Consulting Ophthalmologist Eastern Pennsylvania Institution for the Feeble-minded and Epileptic; Ophthalmic Surgeon to the Pennsylvania Railroad Company. 235 S. Thirteenth St.

*1868. Cheston, D. Murray, M.D. Harwood P. O., Md.

1897. Cheston, Radcliffe, M.D., Visiting Physician to the Chestnut Hill Hospital; Consulting Physician to the Germantown Hospital, and to the Pennsylvania Institution for the Deaf and Dumb. Chestnut Hill.

1904. Christian, Hilary M., M.D., Clinical Professor of Genito-urinary Diseases in the Medico-Chirurgical College. 1321 Spruce St.

1903. Chrystie, Walter, M.D. One of the Senior Physicians to Bryn Mawr Hospital. Bryn Mawr, Pa.

1899. Clark, John G., M.D., Professor of Gynecology in the University of Pennsylvania; Gynecologist-in-Chief to the University Hospital. 2017 Walnut St.

ELECTED

1896. Cleveland, Arthur H., M.D., Clinical Professor of Laryngology in the Medico-Chirurgical College; Laryngologist to the Medico-Chirurgical Hospital; Laryngologist and Aurist to the Presbyterian Hospital, and to Pennsylvania Institution for Deaf and Dumb. 256 S. Fifteenth St.

1910. Cloud, J. Howard, M.D., Assistant Physician to the Bryn Mawr Hospital; Attending Physician to the Children's House of Bryn Mawr Hospital. 7 W. Lancaster Ave., Ardmore, Pa.

1903. Coates, George Morrison, A.B., M.D., Professor of Otology, University of Pennsylvania, Graduate School of Medicine; Surgeon to the Out-Patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Consulting Laryngologist to the Philadelphia Orphanage and to the Sharon Hospital. 1736 Pine St.

1908. Codman, Charles A. E., M.D., Physician to the American Oncologic Hospital. 4116 Spruce St.

1907. Cohen, Myer Solis, A.B., M.D., Pediatrist to the Jewish Hospital, and to the Philadelphia Jewish Sanatorium for Consumptives, Eagleville, Pa.; Assistant Visiting Physician to the Philadelphia General Hospital; Consulting Physician to the Home for Consumptives, Chestnut Hill. 4102 Girard Ave.

1888. Cohen, Solomon Solis, M.D., Professor of Clinical Medicine in the Jefferson Medical College; Physician to the Jefferson Medical College Hospital, to the Philadelphia General Hospital, to the Jewish Hospital, and to the Rush Hospital. 1525 Walnut St.

1898. Coles, Stricker, M.D., Assistant Professor of Obstetrics in the Jefferson Medical College; Assistant Obstetrician to the Jefferson and the Philadelphia General Hospitals; Visiting Physician to the Philadelphia Lying-in-Charity Hospital. 2103 Walnut St.

1901. Coley, Thomas Luther, A.B., M.D., Attending Physician Methodist Episcopal Hospital, Philadelphia. 256 S. Fifteenth St.

1903. Coplin, W. M. L., M.D., Professor of Pathology in the Jefferson Medical College; Pathologist to and Director of the Laboratories of the Jefferson Medical College Hospital; Pathologist to the Philadelphia General Hospital and to the Friends' Asylum for the Insane, Frankford; Bacteriologist to the Pennsylvania State Board of Health. 606 S. Forty-eighth St.

ELECTED

1912. Copp, Owen, A.B., M.D., Physician-in-chief and Superintendent of the Pennsylvania Hospital for the Insane. Pennsylvania Hospital for the Insane, Forty-fourth and Market Sts.

1911. Cornell, Walter Stewart, A.B., M.D., Director of Medical Inspection of Public Schools of the City of Philadelphia; Chief of Medical Staff of the House of Detention; Lecturer on Osteology in the University of Pennsylvania; Lieutenant, Medical Reserve Corps, U. S. A. 729 City Hall.

1914. Corson, Edward Foulke, M.D., Physician for Diseases of the Skin, Presbyterian Hospital Dispensary; Assistant Dermatologist, Children's Hospital Dispensary. Cynwyd, Pa.

1907. Council, Malcolm S., M.D., Attending Physician to the Bryn Mawr Hospital; Attending Physician to the Cathcart Home at Devon. Bryn Mawr, Pa.

*1909. Craig, Alexander R., A.M., M.D. 535 N. Dearborn St., Chicago, Ill.

1904. Craig, Frank A., M.D., Instructor in Medicine in the University of Pennsylvania; Visiting Physician to the Henry Phipps Institute, University of Pennsylvania; Visiting Physician to the White Haven Sanatorium; Tuberculosis Consultant to the Presbyterian Hospital. 244 S. Twenty-first St.

1907. Crampton, George S., M.D., Attending Surgeon to the Eye Department of the Pennsylvania Hospital and the Philadelphia Hospital for Contagious Diseases; Assistant Surgeon to the Wills Hospital; Lecturer on Physiologic Optics in the Philadelphia Polyclinic and School for Graduates in Medicine; Ophthalmologist to the Philadelphia Orphanage. 1700 Walnut St.

1917. Cross, Sumner H., A.B., M.D., Physician to the Abington Memorial Hospital, Abington, Pa. 412 York Road, Jenkintown, Pa.

1904. Cruice, John M., M.D., Physician to the Henry Phipps Institute of the University of Pennsylvania; Physician to the Medical Dispensary of St. Agnes' Hospital; Instructor in Medicine in the University of Pennsylvania. 1932 Spruce St.

*1910. Cummins, W. Taylor, M.D., Pathologist to the Southern Pacific Hospital; Director of the Mary W. Harriman Research Laboratory, San Francisco, Cal.

1902. Currie, Charles A., M.D., Physician to the Germantown Hospital. West Walnut Lane, Germantown.

ELECTED

1903. Da Costa, John C., Jr., M.D., Associate Professor of Medicine in the Jefferson Medical College; Assistant Physician to the Jefferson Medical College Hospital; Hematologist to the German Hospital; Consulting Physician to the Northwestern General Hospital. 1529 Pine St.

1896. Da Costa, John Chalmers, M.D., Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College; Surgeon to the Philadelphia General and St. Joseph's Hospitals. 2045 Walnut St.

1887. Daland, Judson, M.D., Professor of Medicine in the Graduate School of Medicine, University of Pennsylvania. 317 S. Eighteenth St.

°1859. Darrach, James, M.D., Consulting Surgeon to the Germantown Hospital. Preston Apartments, Atlantic City, N. J.

1896. Davis, Charles N., M.D., Dermatologist to the Pennsylvania Hospital; Consulting Dermatologist to St. Agnes' Hospital; Assistant Physician to the Dispensary for Skin Diseases in the Howard Hospital. 1931 Spruce St.

1888. Davis, Edward P., A.M., M.D., Professor of Obstetrics in the Jefferson Medical College; Obstetrician to the Jefferson Hospital; Obstetrician and Gynecologist to the Philadelphia General Hospital; Consultant to the Preston Retreat. 250 S. Twenty-first St.

1916. Davis, Warren B., M.D., Oral Surgeon, Philadelphia General Hospital; Assistant Rhinologist and Otologist St. Agnes' Hospital; Assistant Demonstrator of Anatomy Jefferson Medical College; Clinical Assistant in Surgical Dispensary Jefferson Hospital. 135 S. Eighteenth St.

1900. Davisson, Alex. Heron, M.D., Physician-in-Charge, State Tuberculosis Dispensary at Ardmore, Pa. 1017 S. Forty-sixth St.

1894. Deaver, Harry C., M.D., Professor of Surgery in the Woman's Medical College of Pennsylvania; Surgeon to the Episcopal Hospital, and to the Children's Hospital of the Mary J. Drexel Home; Surgeon-in-Chief to the Kensington Hospital for Women. 1701 Spruce St.

1887. Deaver, John B., M.D., D.Sc., LL.D., John Rea Barton Professor of Surgery, University of Pennsylvania; Visiting Surgeon, Hospital of the University of Pennsylvania; Surgeon-in-Chief to the Lankenau Hospital. 1634 Walnut Street.

1902. Dehoney, Howard, M.D. 240 S. Thirteenth St.

ELECTED

1885. Dercum, Francis X., A.M., M.D., Ph.D., Professor of Nervous and Mental Diseases in the Jefferson Medical College; Consulting Neurologist to the Philadelphia General Hospital; Foreign Corresponding Member of the Neurological Society of Paris, and Corresponding Member of the Psychiatric and Neurological Society of Vienna. 1719 Walnut St.

1908. Despard, Duncan L., M.D., Surgeon to the Abington Memorial Hospital; Assistant Surgeon to the Jefferson Medical College Hospital; Demonstrator of Clinical Surgery in the Jefferson Medical College; Associate in Gynæcology in the Philadelphia Polyclinic Hospital. 1806 Pine St.

1912. Dewey, J. Hiland, Ph.B., M.D., Assistant Surgeon to Wills Eye Hospital; Ophthalmic Surgeon to St. Francis' Hospital, Trenton, N. J. 1436 Diamond St.

*1911. Dickson, Frank D., M.D. St. Regis Hotel, Kansas City, Mo.

1908. Dillard, Henry K., Jr., M.D., Physician to the Out-patient Department of the Pennsylvania Hospital; Physician to the Dispensary of the Mary J. Drexel Home. 234 S. Twentieth St.

*1897. Dorland, W. A. Newman, A.M., M.D., Professor of Gynecology in the Post-graduate Medical School of Chicago; Professor of Obstetrics in the Chicago College of Medicine and Surgery; Visiting Obstetrician to Cook County Hospital; First Lieutenant, Medical Reserve Corps, U. S. Army. 7 West Madison St., Chicago, Ill.

1907. Dorrance, George Morris, M.D., Surgeon to St. Agnes' Hospital; Demonstrator of Applied Anatomy in the Dental Department of the University of Pennsylvania. 2025 Walnut St.

°1864. Downs, R. N., M.D., Consulting Physician to the Germantown Hospital. 5916 Greene St., Germantown.

1902. Downs, Robert N., Jr., M.D., Surgeon to the Dispensary of the Germantown Hospital. 6008 Greene St., Germantown.

1910. Drayton, William, Jr., M.D., Physician to the Philadelphia Hospital for Contagious Diseases; Physician to the Out-patient Department of the Pennsylvania Hospital; Physician to the Pennsylvania Institute for the Instruction of the Blind; Assistant Physician to the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases. 1316 Locust Street.

1881. Dulles, Charles Winslow, M.D., Consulting Surgeon of the Rush Hospital. 4101 Walnut St.

ELECTED

1911. Earnshaw, Henry Culp, M.S., M.D., Attending Physician to the Hospital of the Good Shepherd, Rosemont; Assistant Attending Physician to the Bryn Mawr Hospital; Attending Physician to the Bryn Mawr Children's Hospital; Pennsylvania Railroad Surgeon. Bryn Mawr, Pa.

*1887. Edwards, William A., M.D., Professor of Pediatrics in the Medical Department of the University of California. Fifth and Spring Sts., Los Angeles, Cal.

1911. Eliason, Eldridge E., B.A., M.D., Associate in Surgery in the University of Pennsylvania; Surgeon to the Howard Hospital; Assistant Surgeon to the University of Pennsylvania Hospital, the Philadelphia General Hospital and the American Stomach Hospital. 330 S. Sixteenth St.

1904. Elmer, Walter G., B.S., M.D., Instructor in Orthopedic Surgery in the University of Pennsylvania; Assistant Orthopedic Surgeon to the University Hospital; Orthopedic Surgeon to the Jewish Hospital; Surgeon to the Pennsylvania Training School for Children. 1801 Pine St.

1896. Ely, Thomas C., A.M., M.D. 2041 Green St.

1901. Erck, Theodore A., M.D., Surgeon to the Gynecean Hospital; Obstetrician to the Jewish Maternity Hospital; Associate in Gynecology in the Philadelphia Polyclinic and College for Graduates in Medicine. 251 S. Thirteenth St.

1893. Eshner, Augustus A., M.D., Consulting Physician to Mercy Hospital. 1019 Spruce St.

*1905. Evans, Joseph S., Jr., A.B., M.D., Professor of Clinical Medicine in the University of Wisconsin; Consulting Physician, Madison General Hospital. University of Wisconsin, Madison, Wis.

1905. Evans, William, M.D. 4007 Chestnut St.

1912. Eves, Curtis C., M.D., Aural and Laryngeal Surgeon to the Episcopal Hospital; Assistant in the Out-patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Demonstrator of Operative Surgery of the Ear, Nose, and Throat in the Philadelphia Polyclinic. 247 S. Seventeenth St.

1894. Faries, Randolph, M.D. 2007 Walnut St.

†1903. Farr, Clifford B., A.B., M.D., Professor of Diseases of the Stomach, etc., in the Philadelphia Polyclinic; Associate in Medicine in the University of Pennsylvania; Assistant Physician to the Philadelphia General Hospital. 1824 Pine St.

ELECTED

1893. Farr, William W., M.D., Physician to the Leamy Home. Springfield Ave. and Lincoln Drive, Chestnut Hill.

1884. Fenton, Thomas H., M.D., Ophthalmic Surgeon to St. Vincent's Home, the Baptist Home and the Widener Home for Crippled Children. 1319 Spruce Street.

1907. Fetterolf, George, A.B., M.D., Sc.D., Laryngologist to the Henry Phipps Institute for Tuberculosis; Laryngologist to the White Haven Sanatorium; Consulting Laryngologist to the Phœnixville Hospital; Demonstrator of Anatomy in the University of Pennsylvania. 2047 Chestnut St.

1907. Fife, Charles A., A.B., M.D., Associate in Pediatrics in the University of Pennsylvania; Pediatrist to the Presbyterian Hospital; Physician to the St. Christopher's Hospital for Children; Assistant Physician to the Philadelphia General Hospital. 2038 Chestnut St.

1884. Fisher, Henry M., M.D. 1027 Pine St.

1910. Fisher, John Monroe, M.D., Associate Professor of Gynecology in the Jefferson Medical College; Gynecologist to the Philadelphia, St. Agnes', and Pottstown Hospitals; Assistant Gynecologist to the Jefferson Medical College Hospital. 222 S. Fifteenth St.

1888. Flick, Lawrence F., M.D. 736 Pine St.

1916. Forst, John R., M.D. 166 W. Coulter St., Germantown.

1908. Foulkrod, Collin, M.D., Obstetrician to the Maternity House of the Presbyterian Hospital; Assistant Demonstrator of Obstetrics in Jefferson Medical College; Gynecologist to the Dispensary of the Presbyterian Hospital. 4005 Chestnut St.

1908. Fox, Herbert, M.D., Director of the William Pepper Laboratory of Clinical Medicine, University of Pennsylvania; Pathologist to the Laboratory of Comparative Pathology of the Zoölogical Society of Philadelphia; Pathologist to the Rush Hospital; Pathologist to the Children's Hospital. 3902 Locust St.

†1885. Fox, Joseph M., M.D. Torresdale, Pa.

1906. Fraley, Frederick, Jr., A.B., M.D. 1701 De Lancey Place.

1903. Francine, Albert Philip, A.M., M.D., Associate Professor of Medicine Post Graduate School of Medicine, University of Pennsylvania; Director of State Clinics, Medical Dispensary Building of the Medico-Chirurgical Hospital; Visiting Physician, Department of Tuberculosis, Philadelphia General Hospital. 264 S. Twenty-first St.

ELECTED

1897. Frazier, Charles H., A.B., M.D., Sc.D., Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University Hospital. 1724 Spruce St.

†1890. Freeman, Walter J., M.D., Emeritus Professor of Laryngology in the Philadelphia Polyclinic; Consulting Laryngologist to the Pennsylvania Institution for the Deaf and Dumb. 1832 Spruce St.

1916. Funk, Elmer Hendricks, M.D. 1318 Spruce St.

1910. Furbush, Charles Lincoln, M.D. 4300 Spruce St.

1919. Furness, William Henry, M.D. Wallingford, Pa.

1889. Fussell, M. Howard, M.D., Professor of Applied Therapeutics in the University of Pennsylvania; Physician to the University Hospital, the Episcopal Hospital, St. Timothy's Hospital, and St. Mary's Hospital. 2035 Walnut St.; 421 Lyceum Ave., Roxborough.

1899. Gamble, Robert G., M.D., one of the Attending Physicians to the Bryn Mawr Hospital. Haverford, Pa.

1912. Gaskill, Henry Kennedy, M.D., Assistant Professor of Dermatology in the Jefferson Medical College; Attending Dermatologist to the Philadelphia General Hospital. N. E. Cor. 16th and Spruce Sts.

1917. Gerhard, Arthur Howell, M.D. 2110 Pine St.

1873. Gerhard, George S., M.D., Physician-in-Chief to the Bryn Mawr Hospital; Consulting Physician to Bryn Mawr College; Consulting Physician to Villa Nova College. Fifty-eighth Street and Overbrook Ave.

1902. Ghriskey, Albert A., M.D. 3936 Walnut St.

1899. Gibbon, John H., M.D., Professor of Surgery in the Jefferson Medical College; Surgeon to the Pennsylvania Hospital and Consulting Surgeon to the Bryn Mawr Hospital. 1608 Spruce St.

1908. Gildersleeve, Nathaniel, M.D., Professor of Microbiology and Bacteriopathology; The Thomas W. Evans Museum and Dental Institute School of Dentistry University of Pennsylvania. School of Dentistry, University of Pennsylvania.

*1913. Ginsburg, Nathaniel, M.D., Surgeon to the Jewish Hospital; Associate in Surgery in the Philadelphia Polyclinic and College for graduates in Medicine; Assistant Surgeon to Mt. Sinai Hospital; Instructor in Anatomy in the University of Pennsylvania. 2587 Woodward Ave., Detroit, Mich.

ELECTED

1897. Girvin, John H., M.D., Gynecologist to the Presbyterian Hospital. 2120 Walnut St.

1906. Gittings, J. Claxton, M.D., Associate in Pediatrics in the University of Pennsylvania, School of Medicine; Assistant Pediatric Physician to the University Hospital; Director and Visiting Physician to the Children's Hospital of Philadelphia. 1805 Pine St.

1905. Given, Ellis E. W., M.D., Surgeon to the Philadelphia Freemasons Memorial Hospital of the Masonic Home, Elizabethtown, Pa.; Surgeon to the Dispensary of the Episcopal Hospital. 2018 Chestnut St.

1894. Gleason, E. B., S.B., M.D., LL.D., Professor of Otology in the Medico-Chirurgical College. 2033 Chestnut St.

1906. Goepp, R. Max, M.D., Professor of Medicine in the Graduate School of Medicine, University of Pennsylvania. 124 S. Eighteenth St.

1906. Goldberg, Harold G., M.D., Ophthalmic Surgeon to the Episcopal Hospital and to the Kensington Hospital for Women. 1925 Chestnut St.

1908. Goodman, Edward H., M.D., Associate in Medicine in the University of Pennsylvania; Consultant to the Medical Dispensary of the University Hospital; Assistant Physician to the University Hospital; Assistant Physician to the Philadelphia General Hospital. 248 S. Twenty-first St.

1905. Gordon, Alfred, M.D., Neurologist to the Mt. Sinai, the Northwestern General, and the Douglass Memorial Hospitals. 1812 Spruce St.

*†1897. Gould, George M., A.M., M.D. 215 Atlantic Ave., Atlantic City, N. J.

1894. Graham, Edwin E., M.D., Professor of Pediatrics in the Jefferson Medical College; Pediatrist to the Jefferson and the Philadelphia General Hospitals; Physician to the Franklin Reformatory Home. 1713 Spruce St.

1885. Graham, John, M.D. 326 S. Fifteenth St.

1904. Grayson, Charles P., M.D., Professor of Laryngology and Rhinology in the University of Pennsylvania; Physician-in-Charge of the Throat and Nose Department of the University Hospital; Otolaryngologist to the Philadelphia General Hospital. 262 S. Fifteenth St.

1910. Greenman, Milton J., M.D., Sc.D., Director of the Wistar Institute of Anatomy and Biology. Wistar Institute of Anatomy and Biology, Thirty-sixth St. and Woodland Ave.

ELECTED

1883. Griffith, J. P. Crozer, A.B., M.D., Ph.D., Professor of Pediatrics in the University of Pennsylvania; Corresponding Member of the Société de Pédiatrie de Paris; Physician to the Children's Hospital of Philadelphia. 1810 Spruce St.

1912. Griscom, J. Milton, B.S., M.D., Assistant Surgeon to the Wills Eye Hospital; Chief of Clinic of the Eye Dispensary of the Presbyterian Hospital. 1925 Chestnut St.

1911. Gummey, Frank Bird, M.D., Visiting Physician to the Germantown Hospital and Dispensary; Visiting Physician to the Midnight Mission. 5418 Greene St., Germantown.

*1902. Gwyn, Norman B., M.D., Instructor in Medicine in the University of Pennsylvania. 20 S. Twenty-first St.

1894. Hamill, Samuel McC., M.D., Professor of Diseases of Children in the Philadelphia Polyclinic and College for Graduates in Medicine; Pediatrist to the Presbyterian Hospital; Pediatrist to St. Vincent's Home. 1822 Spruce St.

1897. Hand, Alfred, Jr., M.D., Visiting Physician to the Children's Hospital, to the Children's Hospital of the Mary J. Drexel Home, and to the Methodist Hospital. 1724 Pine St.

1886. Hansell, Howard F., M.D., Professor of Ophthalmology in the Jefferson Medical College; Ophthalmic Surgeon to the Philadelphia General Hospital and to the Jefferson Medical College Hospital; Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic. N. E. Cor. 17th and Walnut Sts

1889. Hare, Hobart A., M.D., Professor of Therapeutics, Materia Medica, and Diagnosis in the Jefferson Medical College. 1801 Spruce St.

1903. Hart, Charles D., A.M., M.D., Inspector and Secretary of the Eastern State Penitentiary; National Executive Committee and Chairman of the Philadelphia Committee, Boy Scouts of America. Chestnut Hill.

1885. Harte, Richard H., M.D., Adjunct Professor of Surgery in the University of Pennsylvania; Surgeon to the Pennsylvania and the Orthopædic Hospitals; Consulting Surgeon to St. Mary's, St. Timothy's, and the Bryn Mawr Hospitals. 1503 Spruce St.

1888. Hartzell, Milton B., A.M., M.D., LL.D., Professor of Dermatology in the University of Pennsylvania. 3644 Chestnut St.

ELECTED

1907. Hatfield, Charles James, A.B (Princeton), M.D., Executive Director of the Henry Phipps Institute for the Study, Treatment, and Prevention of Tuberculosis; Visiting Physician to the White Haven Sanatorium. 2008 Walnut St.

1872. Hays, I. Minis, M.D. 266 S. Twenty-first St.

1911. Heed, Charles R., M.D., Ophthalmologist to Girard College; Assistant Ophthalmologist to the Jefferson Medical College Hospital. 1402 Spruce St.

1908. Heineberg, Alfred, P.D., M.D., Associate in Gynecology in the Jefferson Medical College; Assistant Gynecologist to St. Agnes' Hospital. 1642 Pine St.

1901. Heisler, John C., M.D., Professor of Anatomy in the Medico-Chirurgical College. 3829 Walnut St.

1884. Henry, Frederick P., A.M., M.D., Emeritus Professor of the Principles and Practice of Medicine in the Woman's Medical College of Pennsylvania; Emeritus Physician to the Philadelphia General Hospital; Consulting Physician to the Chestnut Hill Hospital. 114 S. Eighteenth St.

1903. Henry, J. Norman, M.D., Physician to the Pennsylvania Hospital; Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania; Assistant Physician to the Philadelphia General Hospital. 1906 Spruce St.

1891. Hewson, Addinell, A.B., A.M., M.D., Professor of Anatomy in the Philadelphia Polyclinic and College for Graduates in Medicine; Professor of Anatomy and Histology in the Temple University; Surgeon to St. Timothy's Hospital, Roxborough. 2120 Spruce St.

1909. Higbee, William S., M.D., President of the Pennsylvania State Board of Examiners for Registration of Nurses. 1703 S. Broad St.

1910. Hill, Howard Kennedy, M.D., Assistant Instructor in Medicine in the University of Pennsylvania; Physician to the Children's Medical Dispensary of the Presbyterian Hospital; Visiting Physician to the University Settlement, and to the Day Nursery; Assistant Physician to the Medical Dispensary of the Children's Hospital. Villa Nova, Pa.

1897. Hinkle, William M., M.D., Lecturer on the Anatomy and Physiology of the Vocal Organs in the National School of Elocution and Oratory. 1323 N. Thirteenth St.

*1892. Hinsdale, Guy, A.M., M.D. Hot Springs, Virginia.

*1888. Hirsh, A. Bern, M.D., U. S. Army General Hospital, Fox Hills, Staten Island, N. Y.

ELECTED

1888. Hirst, Barton Cooke, A.B., M.D., LL.D., Professor of Obstetrics in the University of Pennsylvania; Gynecologist to the Philadelphia General and the Howard Hospitals. 1821 Spruce Street.

1903. Hirst, John Cooke, M.D., Associate in Obstetrics, University of Pennsylvania; Gynecologist and Obstetrician to the Philadelphia General Hospital; Obstetrician to St. Agnes' Hospital; Gynecologist to the American Hospital for Diseases of the Stomach; Assistant Obstetrician to the University Hospital. 1823 Pine St.

1908. Hitchens, Arthur Parker, M.D. 3229 Washington Boulevard, Indianapolis, Ind.

1905. Hodge, Edward Blanchard, A.B., M.D., Surgeon to the Presbyterian and the Children's Hospitals; Surgeon to the Out-patient Department of the Pennsylvania Hospital; Associate Surgeon to the Widener Memorial School. 346 S. Sixteenth Street.

1913. Hoffman, Clarence, M.D., 1621 Pine St.

°1885. Holland, James W., A.M., M.D., Sc.D., Emeritus Professor of Medical Chemistry and Toxicology and Dean of the Jefferson Medical College. 2006 Chestnut St.

1906. Holloway, Thomas B., M.D., Professor of Ophthalmology in the Philadelphia Polyclinic and School for Graduates in Medicine; Instructor in Ophthalmology in the University of Pennsylvania; Ophthalmologist to the Orthopædic Hospital and Infirmary for Nervous Diseases; Ophthalmologist to the Pennsylvania Institution for the Instruction of the Blind at Overbrook. 1819 Chestnut St.

1914. Hooker, Richard S., M.D. 110 S. Nineteenth St.

1919. Hopkins, Arthur H., M.D. 1726 Pine St.

1908. Hoyt, Daniel M., M.D., Assistant Visiting Physician to the Philadelphia General Hospital. 3604 Chestnut St.

*1912. Huber, G. Carl, M.D., Professor of Anatomy and Director of the Anatomic Laboratories in the University of Michigan. 1330 Hill St., Ann Arbor, Mich.

1892. Hughes, William E., M.D., Visiting Physician to the Philadelphia General Hospital; Pathologist to the Presbyterian Hospital. 3945 Chestnut St.

1912. Hunter, John W., B.S., M.D. 2042 Pine St.

1898. Hutchinson, James P., M.D., Surgeon to the Pennsylvania, the Methodist, the Children's, St. Timothy's, and the Bryn Mawr Hospitals; Adjunct Professor of Surgery in the University of Pennsylvania. 133 S. Twenty-second St.

ELECTED

°1871. Ingham, James V., M.D. 1811 Walnut St.

1917. Jackson, Chevalier, M.D. 1830 S. Rittenhouse Sq.

*1885. Jackson, Edward, A.M., M.D., Sc.D., Professor of Ophthalmology in the University of Colorado; Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic. 318 Majestic Building, Denver, Col.

*1906. Jacobs, Francis Brinton, B.S., M.D., Assistant Surgeon to the Chester County Hospital. Whitford, Pa.

1913. Jefferys, William Hamilton, A.B., A.M., M.D., Surgeon to St. Luke's Hospital, Shanghai; Professor of Surgery in St. John's University, Shanghai; Editor of the China Medical Journal. New Street, Chestnut Hill.

1919. Jenks, Horace H., M.D. 918 Clinton St.

1898. Johnson, Russell H., A.B. (Princeton), M.D., Physician to the Pennsylvania Institution for the Deaf and Dumb. Chestnut Hill, Philadelphia.

1918. Jonas, Leon.

1900. Jones, Charles James, A.M., M.D., LL.D., Ophthalmic Surgeon to St. Joseph's Hospital; Ophthalmic Surgeon to the House of the Good Shepherd, Germantown; Consulting Ophthalmologist to St. Vincent's Home. 1507 Locust Street.

1914. Jones, Isaac H., A.B., A.M., M.D. Medical Arts Building, Sixteenth and Walnut Sts.

1913. Jones, John F. X., B.S., A.B., A.M., M.D., Instructor in Surgery in the Jefferson Medical College; Surgeon to St. Joseph's and the Misericordia Hospitals. 1815 Spruce St.

1900. Jopson, John H., M.D., Professor of Surgery in the Philadelphia Polyclinic; Associate in Surgery in the University of Pennsylvania; Surgeon to the Presbyterian and the Children's Hospitals. 1824 Pine St.

1900. Judson, Charles F., A.B., M.D., Physician to St. Christopher's Hospital for Children, to the Southern Home for Destitute Children and to the Sheltering Arms. 1005 Spruce St.

1902. Jump, Henry D., M.D., Assistant Physician to Philadelphia General Hospital; Physician to the Misericordia Hospital. 2019 Walnut St.

1886. Jurist, Louis, M.D. 1308 N. Broad St.

1903. Kalteyer, Frederick J., M.D., Demonstrator of Clinical Medicine in the Jefferson Medical College; Chief of the

ELECTED

Out-patient Department, Assistant Attending Physician, and Hematologist to the Jefferson Medical College Hospital; Pathologist to Philadelphia Lying-in Charity. 1533 Pine St.

*1910. Karsner, Howard T., M.D., Professor of Pathology in the Western Reserve University Medical School. Lakeside Hospital, Cleveland, Ohio.

†1867. Keen, William W., M.D., LL.D., Sc.D. (Hon.) F.R.C.S. (Eng. and Edin.), Emeritus Professor of the Principles of Surgery and of Clinical Surgery in the Jefferson Medical College; Membre Correspondant Etranger de la Société de Chirurgie de Paris; Honorary Member of the Société Belge de Chirurgie and of the Clinical Society of London. 1729 Chestnut St.

1912. Keene, Floyd E., M.D., Instructor in Gynecology in the University of Pennsylvania; Assistant Gynecologist to the University Hospital; Gynecologist to the Chestnut Hill Hospital. 2017 Walnut St.

1913. Kelly, Francis Joseph, M.D. 1809 Chestnut St.

*1887. Kelly, Howard A., A.B., M.D., LL.D. (Aberdeen, Wash. and Lee, and Univ. of Pa.), Professor of Gynecology in Johns Hopkins University and Gynecologist to the Johns Hopkins Hospital, Baltimore, Md.; Hon. Fellow of the Edinburgh Obstetrical Society, the Royal Academy of Medicine of Ireland, and of the Glasgow Obstetrical and Gynecological Society. 1418 Eutaw Place, Baltimore, Md.

1909. Kelly, James A., A.M., M.D., Visiting Surgeon to St. Mary's and St. Timothy's Hospitals; Associate in Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; Assistant Visiting Surgeon to St. Joseph's Hospital. 1510 N. Seventeenth St.

1912. Kelly, Thomas C., A.M., M.D., Assistant Instructor of Medicine in the University of Pennsylvania; Pediatrician to St. Mary's Hospital; Physician to Out-patient Department of Germantown Hospital. 105 School Lane, Germantown.

1898. Kempton, Augustus F., M.D. 2118 Pine St.

1905. Kercher, Delno E., M.D. 1534 Pine St.

1913. Klopp, Edward J., M.D., Instructor in Surgery in the Jefferson Medical College; Assistant Surgeon to the Germantown Hospital; Chief Clinical Assistant in the Surgical Department of the Jefferson Hospital; Assistant Surgeon to the Out-patient Department of the Pennsylvania Hospital. 1223 Spruce St.

ELECTED

1895. Kneass, Samuel S., M.D., Associate in the William Pepper Laboratory of Clinical Medicine in the University of Pennsylvania. 1510 Walnut St.

1908. Knipe, Jay C., M.D., Ophthalmologist to the Jewish Hospital; Assistant Ophthalmologist to the Philadelphia General Hospital, and to the Mary J. Drexel Home; Chief of the Eye Clinic at the Jefferson Medical College Hospital; Demonstrator of Osteology and Syndesmology in the Jefferson Medical College. 2035 Chestnut St.

1919. Knipe, Norman Leslie, M.D. 2007 Chestnut St.

1908. Knowles, Frank Crozer, M.D., Instructor in Dermatology in the University of Pennsylvania; Clinical Professor of Dermatology in the Woman's Medical College; Dermatologist to the Presbyterian Hospital; Assistant Dermatologist to the Dispensary of the Pennsylvania Hospital. 2022 Spruce Street.

1914. Kolmer, John A., M.D., Dr. P.H., M.Sc., Assistant Professor of Experimental Pathology in the University of Pennsylvania; Professor of Pathology and Pathologist to the Department of Dermatological Research, Philadelphia Polyclinic; Pathologist to the Philadelphia Hospital for Contagious Diseases; Serologist to St. Agnes' and St. Timothy's Hospitals. 927 S. St. Bernard St.

1904. Krauss, Frederick, M.D., Ophthalmic Surgeon to the Episcopal Hospital; Ophthalmic and Aural Surgeon to St. Christopher's Hospital for Children; Laryngologist to the Abington Hospital; Ear, Nose and Throat Physician to the Children's Seashore House for Invalid Children, Atlantic City, N. J. 1701 Chestnut Street.

1905. Kremer, Walter H., M.D., 5904 Greene St., Germantown.

1914. Krumbhaar, Edward B., A.B., Ph.D., M.D., Assistant Professor in Research Medicine University of Pennsylvania; Physician to Out-patient Department, Pennsylvania Hospital. W. Mermaid Lane, Chestnut Hill.

1900. Krusen, Wilmer, M.D., Professor of Gynecology in the Medical Department of Temple University; Chief Gynecologist to the Samaritan and the Garretson Hospitals; Consulting Gynecologist to the Charity and Mercy Hospitals. 127 N. Twentieth St.

1909. Laird, J. Packard, M.D., Visiting Physician to the Devon Branch of Presbyterian Hospital of Philadelphia. Devon, Pa.

ELECTED

1904. Landis, Henry R. M., M.D., Director of the Clinical and Sociological Departments of the Henry Phipps Institute of the University of Pennsylvania; Assistant Professor in Medicine in the University of Pennsylvania; Visiting Physician to the White Haven Sanatorium. 11 S. Twenty-first St.

1907. Langdon, H. Maxwell, M.D., Instructor in Ophthalmology in the University of Pennsylvania; Assistant Surgeon to the Dispensary for Diseases of the Eye in the University Hospital; Assistant Ophthalmologist to the Orthopædic Hospital; Chief of the Dispensary for Diseases of the Eye of the Presbyterian Hospital. 2018 Chestnut St.

1887. Leaman, Henry, M.D. 832 N. Broad St.

1904. Le Boutillier, Theodore, M.D., Professor of Pediatrics in the Woman's Medical College of Pennsylvania; Pediatrist to the Woman's College Hospital; Physician to the Philadelphia Hospital for Contagious Diseases. 2008 Walnut St.

1893. Le Conte, Robert G., A.B., M.D., Surgeon to the Pennsylvania and the Bryn Mawr Hospitals; Consulting Surgeon to Germantown and Gynecean Hospital. 2000 Spruce St.

1908. Lee, Walter Estell, M.D., Surgeon to the Germantown and Children's Hospitals; Surgeon to the Out-Patient Department of the Pennsylvania Hospital; Assistant Surgeon to the Bryn Mawr Hospital. 905 Pine St.

1903. Leffmann, Henry, A.M., M.D., D.D.S., Ph.D., Professor of Chemistry in the Woman's Medical College of Pennsylvania; Honorary Professor of Chemistry in the Wagner Free Institute of Science; Pathological Chemist to the Jefferson Medical College Hospital. 1839 N. Seventeenth St.

1892. Leidy, Joseph, M.D., Officier d'instruction publique, France; Consulting Physician to the Pennsylvania Training School for Feeble-minded Children. 1319 Locust St.

1909. L'Engle, Edward M., M.D. Jacksonville, Fla.

1915. Lewis, Fielding O., M.D., Associate in Laryngology in the Jefferson Medical College Hospital; Operating Clinical Chief of the Laryngological Dispensary and Clinical Assistant of the Otological Dispensary of the Jefferson Medical College Hospital; Laryngologist of the Philadelphia General Hospital. 261 S. Seventeenth St.

1877. Lewis, Morris J., M.D., Attending Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases and Emeritus Physician to the Pennsylvania Hospital. 1316 Locust St.

ELECTED

1911. Lewis, Paul A., M.D., Director of the Pathological Department of the Henry Phipps Institute of the University of Pennsylvania; Assistant Professor of Pathology in the University of Pennsylvania. Henry Phipps Institute. Seventh and Lombard Streets.

1904. Lindauer, Eugene, M.D., Instructor of Neurology in the Medico-Chirurgical Hospital; Associate in Clinical Medicine in the Philadelphia Polyclinic; Assistant Neurologist to the Philadelphia General Hospital. 2018 N. Thirty-second Street.

1886. Lloyd, J. Hendrie, A.M. (Princeton), M.D., Neurologist to the Philadelphia General Hospital, and to the Methodist Episcopal Hospital; Consulting Neurologist to the State Asylum for the Chronic Insane at Wernersville, and to the Pennsylvania Training School for Feeble-minded Children at Elwyn. 4057 Spruce St.

1907. Lodholz, Edward, M.D., Demonstrator of Physiology in the University of Pennsylvania. 1106 S. 52d St.

1893. Longaker, Daniel, M.D., Obstetrician to the Kensington Hospital for Women and Visiting Obstetrician to the Jewish Maternity Hospital. 1402 N. Sixteenth St.

1907. Loux, Hiram R., M.D., Professor of Genito-urinary Surgery in the Jefferson Medical College; Surgeon to the Philadelphia General Hospital. Medical Arts Building, Sixteenth and Walnut Sts.

1919. Lynch, Frank B., Jr., M.D., Pepper Laboratory, University of Pennsylvania.

1914. Lyon, B. B. Vincent, A.B. (Williams Coll.), M.D. 1901 Pine St.

1900. McCarthy, Daniel J., M.D., Professor of Medical Jurisprudence (George B. Wood Foundation) in the University of Pennsylvania; Neurologist to the Philadelphia General and St. Agnes' Hospitals, and to the Henry Phipps Institute. 2025 Walnut St.

*1903. McConnell, Guthrie, M.D., Director of the Research Laboratory of the National Dental Association, Cleveland, Ohio. 8803 Euclid Ave., Cleveland, O.

1913. McCrae, Thomas, B.A., M.D., F.R.C.P. (Lond.), Professor of Medicine in the Jefferson Medical College; Physician to the Jefferson and Pennsylvania Hospitals. 1627 Spruce Street.

ELECTED

1895. McFarland, Joseph, M.D., Sc.D., Professor of Pathology and Bacteriology in the Medical Department of the University of Pennsylvania; Pathologist to the Philadelphia General Hospital. 442 W. Stafford St., Germantown.

1913. McGlinn, John A., B.A., M.D., Assistant Professor of Obstetrics in the Medico-Chirurgical College; Assistant Obstetrician to the Medico-Chirurgical Hospital; Gynecologist to St. Agnes' Hospital. 113 S. Twentieth St.

1905. McKenzie, Robert Tait, A.B., M.D., Professor of Physical Education and Director of the Department of Physical Education in the University of Pennsylvania. 2014 Pine St.

1916. McKnight, Howard A., A.B., M.D., Surgeon of Out-patient Department, St. Mary's Hospital; Assistant Surgeon of Out-patient Department, Polyclinic Hospital. 241 S. Thirteenth St.

1915. McLean, John D., M.D. 1538 S. Broad St.

*1900. McReynolds, Robert Phillips, M.D. 213 S. Broadway, Los Angeles, Cal.

1886. MacCoy, Alexander W., M.D. Consulting Laryngologist to the Bryn Mawr Hospital. 1503 Locust St.

1910. Mackinney, William H., M.D., Assistant Surgeon to the Dispensary for Genito-urinary Diseases, University Hospital; Assistant in the Urological Dispensary of the Lankenau Hospital. 1701 Chestnut St.

1914. Maier, F. Hurst, M.D., Associate in Gynecology to the Jefferson Medical College; Gynecologist to St. Joseph's Hospital. 2035 Chestnut St.

1913. Major, C. Percy, M.D., Physician to the Dispensary of the Germantown Hospital; Pediatrist to the Dispensary of the Germantown Hospital; Pediatrist to the Abington Memorial Hospital. Tenth and Oak Lane.

1913. Manges, Willis F., M.D., Roentgenologist to the Jefferson Hospital; Director of the Roentgen Ray Laboratory in the Philadelphia General Hospital. 264 S. Sixteenth St.

1898. Marshall, George Morley, M.D., Laryngologist to the Philadelphia General Hospital; Laryngologist and Otologist to St. Joseph's Hospital. 1819 Spruce St.

1889. Martin, Edward, M.D., John Rhea Barton Professor of Surgery in the University of Pennsylvania; Surgeon to the University, Howard, Philadelphia General, and Bryn Mawr Hospitals. 1506 Locust St.

*1868. Mears, J. Ewing, A.M., M.D., LL.D. 1535 Land Title Building, Broad and Sansom Sts.

ELECTED

*1911. Meigs, Edward Browning, A.B., M.D., Physiologist in the Dairy Division of the United States Department of Agriculture. 1445 Rhode Island Ave., N. W., Washington, D. C.

1914. Mencke, J. Bernhard, A.B., M.D., Assistant Surgeon to the Out-patient Department of the Lankenau Hospital; Assistant Surgeon to the Stetson Hospital. 908 N. Sixteenth Street.

1914. Merrill, Wm. Jackson, A.B., M.D., Instructor in Orthopædic Surgery, University of Pennsylvania; Assistant Orthopædic Surgeon, University Hospital; Orthopædic Surgeon to the Children's Hospital, Children's Seashore House and Howard Hospital; Consulting Orthopædic Surgeon to the Germantown Hospital. Medical Arts Building, Sixteenth and Walnut Sts.

*1894. Miller, D. J. Milton, M.D., Associate Physician to the Children's Hospital, Philadelphia; Pediatrist to the Bamberger Home for Invalid Children, Longport, N. J. N. W. Cor. Pacific and California Aves., Atlantic City, N. J.

1910. Miller, Morris Booth, M.D., Professor of Surgery in the Philadelphia Polyclinic; Surgeon to the Douglass Memorial Hospital; Assistant Surgeon to the Philadelphia General Hospital. 409 S. Twenty-second St.

1881. Mills, Charles K., M.D., LL.D., Emeritus Professor of Neurology in University of Pennsylvania; Neurologist to Philadelphia General Hospital; Consulting Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases. 1909 Chestnut Street.

1917. Mitchell, A. Graeme, M.D., Instructor in Pediatrics, University of Pennsylvania; Clinical Assistant, Children's Hospital of Philadelphia; Physician to Dispensary Children's Hospital of Philadelphia; Assistant Pathologist, Children's Hospital of Philadelphia. 1717 Pine St.

1904. Mitchell, Charles F., M.D., Surgeon to the Pennsylvania, Bryn Mawr, and Germantown Hospitals. 332 S. Fifteenth Street.

1908. Montgomery, Charles M., A.B., M.D., Instructor in the Henry Phipps Institute (University of Pennsylvania); Physician to the Dispensaries of the Pennsylvania and St. Agnes' Hospitals. 2210 Locust St.

1882. Montgomery, Edward E., A.M., M.D., LL.D., Professor of Gynecology in the Jefferson Medical College; Gynecologist to the Jefferson Medical College Hospital and to St. Joseph's Hospital. 1426 Spruce St.

ELECTED

1918. Morgan, Arthur C., M.D., Associate Professor in the Graduate School and Acting Associate in Medicine in the Undergraduate Medical Department, University of Pennsylvania; Visiting Physician to the Tuberculosis Department, Philadelphia General Hospital. 3118 Diamond St.

1886. Morris, Caspar, M.D. 2050 Locust St.

1893. Morris, Elliston J., M.D., Physician to the Episcopal Hospital and to the Midnight Mission. 128 S. Eighteenth St.

1883. Morris, Henry, M.D., Professor of Anatomy in the Woman's Medical College of Pennsylvania; Senior Visiting Physician to St. Joseph's Hospital. 313 S. Sixteenth St.

°1856. Morris, J. Cheston, M.D. 1514 Spruce St.

1906. Morrison, William H., M.D. 8021 Frankford Ave.

1897. Morton, Samuel W., M.D. 1926 Chestnut St.

1905. Müller, George P., M.D., Professor of Surgery in the Graduate School of the University of Pennsylvania; Associate in Surgery in the Medical School of the University of Pennsylvania; Surgeon to the Misericordia and St. Agnes' Hospitals; Consulting Surgeon to the Chester County Hospital. 1930 Spruce St.

1915. Musser, John H., Jr., B.S., M.D., Associate in Medicine in the University of Pennsylvania; Physician to the Philadelphia General Hospital; Physician-in-Charge, Medical Dispensary, University Hospital; Dispensary Chief and Assistant in the Presbyterian Hospital. 121 S. Twentieth Street.

1905. Mutschler, Louis H., M.D., Surgeon to the Episcopal Hospital; Assistant Surgeon to the Orthopædic Hospital. 1625 Spruce St.

*1896. Myers, T. D., M.D. P. O. Box 314, Pasadena, Cal.

1902. Nassau, Charles F., M.D., LL.D., Assistant Professor of Surgery in the Jefferson Medical College; Surgeon to St. Joseph's Hospital; Chief Surgeon to the Frankford Hospital; Surgeon to Mount Sinai Hospital. 1710 Locust St.

1886. Neff, Joseph S., A.M., M.D., LL.D., D.P.H. 106 S. Twenty-first St.

1887. Neilson, Thomas Rundle, A.M., M.D., Surgeon to the Episcopal Hospital and to St. Christopher's Hospital for Children; Professor of Genito-urinary Surgery in the University of Pennsylvania. 1937 Chestnut St.

1905. Newcomet, William S., M.D. 3501 Baring St.

ELECTED

1905. Newlin, Arthur, B.S., M.D., Physician to the Pennsylvania Hospital; Physician to the Dispensary of the Children's Hospital; Assistant Physician to the Orthopædic Hospital. 1804 Pine St.

1899. Nicholson, William Rufus, A.B., M.D., Gynecologist to the Polyclinic and Methodist Episcopal Hospitals; Obstetrician to the Presbyterian Hospital; Associate in Obstetrics in the University of Pennsylvania. 1731 Pine St.

*1889. Noble, Charles P., M.D. Easton, Md.

1905. Norris, Charles C., M.D., Instructor in Gynecology in the University of Pennsylvania; Physician to the Maternity Hospital; Consultant Gynecologist and Obstetrician to the Henry Phipps Institute of the University of Pennsylvania; Assistant Gynecologist to University Hospital. Coronado, 22d and Chestnut Sts.

1905. Norris, George William, A.B., M.D., Assistant Professor of Medicine in the University of Pennsylvania; Physician to the Pennsylvania Hospital; Assistant Physician to the University Hospital. 1820 S. Rittenhouse Sq.

*1901. Norris, Henry, M.D., Surgeon to the Rutherford Hospital. Rutherfordton, N. C.

1892. Norris, Richard C., M.D., Lecturer on Clinical and Operative Obstetrics in the University of Pennsylvania; Obstetrician in Charge of the Preston Retreat; Visiting Obstetrician to the Philadelphia General Hospital; Gynecologist to the Methodist Episcopal Hospital, and Consulting Obstetrician and Attending Gynecologist to the Southeastern Dispensary and Hospital. 500 N. Twentieth St.

1913. O'Neal, Alexander H., A.B., A.M., M.D., Physician to the Cathcart and Richardson Homes, Devon; Anesthetizer to the Bryn Mawr Hospital. St. Davids, Pa.

*1885. Osler, Sir William, Bart., M.D., Regius Professor of Medicine in Oxford University, England. No. 7, Norham Gardens, Oxford, England.

1903. Ostheimer, Maurice, A.B., M.D., Associate in Pediatrics in the University of Pennsylvania; Visiting Physician to the Philadelphia Hospital for Contagious Diseases; Physician-in-Charge of the Children's Dispensary and Assistant Visiting Pediatric Physician, University Hospital; Physician

ELECTED

to the Medical Dispensary of the Children's Hospital. 2202 De Lancey Place.

1913. Outerbridge, George W., A.B., M.D., Assistant Gynecologist to the Methodist and Polyclinic Hospitals; Gynecologist to the Abington Memorial Hospital; Obstetrician to the Maternity Hospital. 2039 Chestnut St.

1915. Owen, Hubley R., M.D., Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the Orthopædic Hospital; Chief Surgeon of the Bureaus of Police and Fire, Philadelphia. 2046 Pine St.

1897. Packard, Francis R., M.D., Surgeon to the Out-patient Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Laryngologist to the Children's Hospital of Philadelphia; Consulting Aurist to the Bryn Mawr Hospital. 304 S. Nineteenth St.

1898. Page, Henry F., M.D., Assistant Physician to the Lankenau Hospital and Physician to the Medical Dispensary of the same; Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania. 315 S. Sixteenth St.

1906. Pancoast, Henry K., M.D., Professor of Röntgenology in the University of Pennsylvania and Röntgenologist to the University Hospital. Wynnewood, Pa.

1909. Parish, Benjamin D., B.S., M.D., Assistant Instructor in Otology in the University of Pennsylvania; Assistant Surgeon to the Dispensary for Diseases of the Ear, University Hospital; Aurist and Laryngologist to St. Agnes' Hospital. 7318 Bryan St., Mt. Airy, Philadelphia.

1899. Parke, William E., M.D., Consulting Obstetrician to the Episcopal Hospital; Associate Surgeon to the Kensington Hospital for Women; Gynecologist to the Frankford Hospital. 1739 N. Seventeenth St.

1910. Patterson, Ross Vernet, M.D., Dean, Jefferson Medical College; Associate Professor of Medicine in the Jefferson Medical College; Physician to the Philadelphia Hospital; Assistant Physician to the Jefferson Hospital. 340 S. Sixteenth St.

1903. Pearce, Richard M., M.D., Sc.D., Professor of Research Medicine in the University of Pennsylvania. 2114 De Lancey Place.

1909. Pemberton, Ralph, M.S., M.D., Visiting Physician to the Presbyterian Hospital; Director of the Department of

ELECTED

Clinical Chemistry in the Pathological Laboratory of the Presbyterian Hospital. 318 S. Twenty-first St.

†1889. Penrose, Charles Bingham, M.D., Ph.D. (Harvard), Formerly Professor of Gynecology in the University of Pennsylvania. 1720 Spruce St.

1914. Pepper, O. H. Perry, B.S. (Univ. of Penna.), M.D. 1811 Spruce St.

†1902. Pepper, William, M.D., Dean of the School of Medicine, University of Pennsylvania. 1813 Spruce St.

1916. Percival, Milton Fraser, M.D. 2332 S. Broad St.

1917. Peter, Luther C., M.D., Professor of Ophthalmology in the Medical Department of Temple University; Ophthalmologist to the Polyclinic Section of the University of Pennsylvania; Ophthalmologic Surgeon to the Samaritan and Garretson Hospitals, the Friends' Hospital for Mental and Nervous Diseases and the Rush Hospital for Consumption and Allied Diseases. 1527 Spruce St.

1912. Petty, Orlando H., B.S., A.M., M.D., Instructor in Medicine in the Jefferson Medical College; Pathologist and Assistant Physician to St. Timothy's Hospital; Physician to the Kensington Dispensary for the Treatment of Tuberculosis. 6215 Ridge Ave.

1905. Pfahler, George E., M.D., Professor of Roentgenology in the Medico-Chirurgical Post-Graduate School of Medicine of the University of Pennsylvania; Director of the *X*-ray Laboratories at the Howard Hospital, Polyclinic Hospital and the Misericordia Hospital. 1321 Spruce St.

1915. Pfeiffer, Damon B., A.B., M.D., Instructor in Surgery, University of Pennsylvania; Assistant Surgeon, University Hospital; Pathologist to the Lankenau Hospital; Director of the Clinical Laboratory, Presbyterian Hospital. 2028 Pine Street.

1907. Pfromm, George W., Ph.G., M.D., Assistant Physician to the American Stomach Hospital; Consulting Physician to the German Protestant Home for the Aged. 1431 N. Fifteenth St.

1907. Phillips, Horace, M.D., Second Assistant Physician to the Pennsylvania Hospital for the Insane; Visiting Physician to the Eastern Penitentiary of Pennsylvania. 905 Land Title Building.

1883. Piersol, George A., M.D., Sc.D., Professor of Anatomy in the University of Pennsylvania. 4724 Chester Ave.

ELECTED

1911. Piersol, George Morris, B.S., M.D., Professor of the Principles and Practice of Medicine in the Woman's Medical College of Pennsylvania; Associate in Medicine in the University of Pennsylvania; Physician to the Philadelphia General Hospital; Assistant Physician to the University Hospital. 1913 Spruce St.

1917. Piper, Edmund Brown, M.D. 6071 Drexel Road, Overbrook, Pa.

1905. Pitfield, Robert L., M.D., Pathologist to the Germantown Hospital; Bacteriologist to the Chestnut Hill Hospital for Lung Diseases. 5211 Wayne Ave.

1896. Posey, William Campbell, M.D., Ophthalmic Surgeon to the Howard Hospital; Consulting Ophthalmic Surgeon to the Wills Eye Hospital; Chairman of the Commission on the Conservation of Vision for Pennsylvania. 2049 Chestnut St.

1899. Potts, Charles S., M.D., Professor of Neurology, Graduate School, University of Pennsylvania; Neurologist to the Philadelphia General Hospital; Consulting Neurologist, Lankenau Hospital; Consulting Neurologist, Hospital for the Insane, Atlantic County, New Jersey, 2018 Chestnut St.

1907. Price, George E., M.D., Associate Professor of Nervous and Mental Diseases in the Jefferson Medical College; Neurologist to the Philadelphia General Hospital. 1830 S. Rittenhouse Square.

†1903. Pyle, Walter L., A.M., M.D., Assistant Surgeon to the Wills Eye Hospital. 1931 Chestnut St.

1908. Radcliffe, McCluney, A.M. (Lafayette), M.D., LL.D., Ophthalmic Surgeon to the Presbyterian Hospital; Attending Surgeon to the Wills Eye Hospital. 1906 Chestnut St.

1913. Randall, Alexander, A.M., M.D., Assistant Instructor in Surgery in the University of Pennsylvania; Assistant Surgeon in the Genito-Urinary Dispensary of the University of Pennsylvania. 1310 Medical Arts Building.

1887. Randall, B. Alexander, M.A., M.D., Professor of Otology in the University of Pennsylvania; Ear Surgeon to the Children's Hospital; Consulting Aurist to the Pennsylvania Institution for the Deaf and Dumb, and to St. Timothy's Hospital. 1717 Locust St.

*1904. Ravenel, Mazyck P., M.D., Professor of Preventive Medicine and Bacteriology and Director of the Public Health Laboratory at the University of Missouri, Columbia, Mo.

ELECTED

1919. Reiman, Stanley P., M.D. 516 Arbutus St., Gtn.

1897. Rhein, John H. W., M.D., Professor of Diseases of the Mind and Nervous System in the Graduate School of Medicine, University of Pennsylvania; Neurologist to the Howard Hospital; Bacteriologist to the Pennsylvania Training School for Feeble-minded Children. 1732 Pine St.

1906. Rhein, Robert D., M.D., Chief Physician to the Clinic of the American Hospital for Diseases of the Stomach; Physician to the Philadelphia Home for Incurables; Examining Physician to the White Haven Sanatorium. 2016 Pine Street.

1891. Rhoads, Edward G., M.D. 159 W. Coulter St., Germantown.

*1910. Rhoads, Samuel, M.D. Pasadena, California.

1919. Richardson, Russell, M.D. 320 S. Sixteenth St.

1919. Ridpath, Robert F., M.D. 1928 Chestnut St.

1898. Riesman, David, M.D., Professor of Clinical Medicine in the University of Pennsylvania; Visiting Physician to the Philadelphia General Hospital; Consulting Physician to the Jewish Hospital. 1715 Spruce Street.

1895. Ring, G. Oram, A.M., M.D., Orphthalmic Surgeon to the Episcopal Hospital; Ophthalmologist to the Widener Memorial Home for Crippled Children; Consulting Ophthalmologist to the American Oncologic Hospital. N. E. Cor. Seventeenth and Walnut Sts.

*1905. Risley, J. Norman, M.D., Assistant Surgeon to the Wills Eye Hospital; Ophthalmologist to the Pennsylvania Training School for Feeble-minded Children. New Bedford, Mass.

1891. Risley, Samuel D., A.M., Ph.D., M.D., LL.D., Consulting Surgeon to the Wills Eye Hospital; Professor (Emeritus) of Ophthalmology in the Philadelphia Polyclinic and College for Graduates in Medicine; Alumnus Manager of the University Hospital. 2018 Chestnut St.

†1878. Roberts, John B., A.M., M.D., Professor of Surgery in the University of Pennsylvania Graduate School of Medicine. 313 S. Seventeenth St.

1899. Roberts, Walter, M.D., Professor of Otology in the Philadelphia Polyclinic; Otologist to the Methodist Episcopal Hospital; Laryngologist to the Philadelphia General Hospital. 1732 Spruce St.

1903. Robertson, William Egbert, M.D., Professor of Theory and Practice of Medicine and of Clinical Medicine in

ELECTED

Temple University; Physician to the Episcopal, Samaritan, and Garretson Hospitals. 327 S. Seventeenth St.

1902. Robinson, James Weir, M.D., Assistant Surgeon to the Presbyterian Hospital. 326 S. Sixteenth St.

1903. Robinson, William Duffield, Ph.G., M.D. 2012 Mount Vernon St.

1912. Rodman, John Stewart, M.D., Lecturer on Surgery in the Medico-Chirurgical College; Assistant Surgeon to the Medico-Chirurgical Hospital; Surgeon to the Dispensary of the Presbyterian Hospital; Assistant Surgeon to the Out-patient Department of the Pennsylvania Hospital. 310 Real Estate Building.

1909. Rosenberger, Randle C., M.D., Professor of Hygiene and Bacteriology in the Jefferson Medical College; Professor of Hygiene and Preventive Medicine in the Woman's Medical College of Pennsylvania; Director of the Clinical Laboratory of the Philadelphia General Hospital. 2330 N. Thirteenth St.

1898. Ross, George G., M.D., Visiting Surgeon, Germantown, Stetson and Methodist Hospitals; Assistant Surgeon, Lankenau Hospital; Assistant Surgeon, Hospital of the University of Pennsylvania; Associate in Surgery, University of Pennsylvania School of Medicine. 1721 Spruce St.

*1907. Royer, B. Franklin, M.D. Donaldson Bldg., Harrisburg, Pa.

†1905. Rugh, James Torrance, A.B., M.D., Clinical Professor of Orthopedic Surgery in the Woman's Medical College of Pennsylvania; Orthopedic Surgeon to the Jefferson Medical College; Orthopedic Surgeon to the Methodist and the Philadelphia General Hospitals. 1616 Spruce St.

1897. Sailer, Joseph, Ph.B., M.D., Professor of Clinical Medicine in University of Pennsylvania; Physician to the Philadelphia General, the University, and Presbyterian Hospitals. 1718 Spruce St.

1900. Sajous, Charles E. de M., M.D., LL.D., ScD., Knight of the Legion of Honor of France; and of the Order of Leopold of Belgium; Professor of Therapeutics in Temple University Medical School. 2043 Walnut St.

1905. Sartain, Paul J., A.M., M.D. 2006 Walnut St.

1908. Sautter, Albert C., M.D., Assistant in the Dispensary for Diseases of the Eye in the University Hospital; Assistant in the Eye Dispensary of the Lankenau Hospital. 1421 Locust St.

ELECTED

1906. Saylor, Edwin S., M.D., Chief Ophthalmic Surgeon to the Charity Hospital of Philadelphia, and to the Department Eye and Ear, American Hospital for Diseases of the Stomach. 2005 Chestnut St.

*1910. Scarlet, Rufus B., M.D., Laryngologist to the Home for Consumptives at Chestnut Hill; Assistant in the Department for Diseases of the Ear, Throat, and Nose of the Pennsylvania Hospital; Instructor in Diseases of the Nose and Throat in the Philadelphia Polyclinic and College for Graduates in Medicine. 78 N. Clinton Ave., Trenton, N. J.

1917. Schaeffer, Jacob Parsons, A.M., M.D., Ph.D., Professor of General Anatomy and Director of the Daniel Baugh Institute of Anatomy of the Jefferson Medical College. 4634 Spruce St.

1899. Schamberg, Jay F., M.D., Professor of Dermatology and Syphilology, Jefferson Medical College; Professor of Dermatology and Infectious Eruptive Diseases, Graduate School, University of Pennsylvania. 1922 Spruce St.

1917. Schnabel, Trueman Gross, A.B. (Lehigh), M.D., Instructor in Medicine, University of Pennsylvania; Assistant Physician Philadelphia General Hospital. 1704 Pine St.

1917. Schoff, Charles H., M.D. Media, Pa.

1887. de Schweinitz, George Edmund, A.M., M.D., LL.D., Professor of Ophthalmology in the University of Pennsylvania; Consulting Ophthalmic Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases; The Philadelphia Polyclinic and School for Graduates in Medicine, and the Philadelphia General Hospital; Ophthalmic Surgeon to the University Hospital. 1705 Walnut St.

*1913. de Schweinitz, George Lord, B.S., M.D., Assistant in the Department of Ophthalmology, St. Luke's Hospital, Bethlehem, Pa. 85 East Broad St., Bethlehem, Pa.

1910. Schwenk, Peter N. K., M.A., M.D., Attending Surgeon to the Eye Department of the Pennsylvania Hospital; Attending Surgeon to the Wills Eye Hospital. 1417 N. Broad Street.

1892. Seiss, Ralph W., M.D., Professor of Otology in the Philadelphia Polyclinic; Consulting Laryngologist to the Pennsylvania Institution for the Deaf and Dumb. 255 S. Seventeenth St.

1917. Service, Charles A., M.D. Bala, Pa.

ELECTED

1908. Shannon, Charles E. G., A.B., M.D., Instructor in Ophthalmology in the Jefferson Medical College; Assistant in the Ophthalmological Clinic at the Jefferson Medical College Hospital; Ophthalmologist to the Seybert Institution. 1633 Spruce St.

1897. Sharpless, William T., M.D., Physician to the Chester County Hospital. West Chester, Pa.

1906. Shields, William G., M.D., Dermatologist to Germantown Hospital; Chief of Dermatological Clinic and Assistant Physician to the Jewish Hospital. 414 School Lane, Germantown.

1890. Shoemaker, George Erety, A.M., M.D., Gynecologist to the Presbyterian Hospital and to the Pennsylvania Epileptic Hospital and Colony Farm. 1906 Chestnut St.

*1908. Shoemaker, Harlan, A.B., M.D., Lecturer in Surgery, University of Southern California, Surgeon to Los Angeles County Hospital, Surgeon to Washington Street Clinic. 621 Marsh Strong Building, Los Angeles, Cal.

†1893. Shoemaker, Harvey, M.D., Visiting Physician to the Sheltering Arms; Consulting Physician to the Southern Home for Destitute Children; Assistant Physician to the Lankenau Hospital; Physician to the Out-patient Department of the Lankenau Hospital. N. W. Cor. 20th and Chestnut Sts.

†1896. Shoemaker, William T., M.D., Clinical Professor of Ophthalmology in the Woman's Medical College of Pennsylvania; Ophthalmic Surgeon to the Germantown and Lankenau Hospitals; Attending Surgeon to the Eye Department of the Pennsylvania Hospital; Consulting Ophthalmologist to the Pennsylvania Institution for Deaf and Dumb, and to the Southern Home for Destitute children. 109 S. Twentieth St.

1900. Shumway, Edward Adams, B.S., M.D., Ophthalmic Surgeon to the Philadelphia General Hospital; Ophthalmic Surgeon to the Children's Hospital; Instructor in Ophthalmology in the University of Pennsylvania, and Assistant Ophthalmic Surgeon to the University Hospital; Ophthalmic Surgeon to the Lankenau Hospital. 2046 Chestnut St.

1903. Sinclair, John Falconer, M.D., Physician to the Medical Dispensary of the Presbyterian Hospital; Physician to the Philadelphia Orphan Asylum and to the Presbyterian Orphanage; Physician to the Home of the Merciful Saviour for Crippled Children. 4103 Walnut St.

ELECTED

1907. Sinkler, Francis Wharton, A.B., M.D., Physician to the Orthopædic Hospital and Infirmary for Nervous Diseases; Physician to the Episcopal Hospital. 1606 Walnut St.

1902. Siter, E. Hollingsworth, M.D., Instructor in Genito-urinary Diseases in the University of Pennsylvania; Genito-urinary Surgeon to the Philadelphia General Hospital; Surgeon-in-Charge of the Genito-urinary Dispensary of the University Hospital; Consulting Genito-urinary Surgeon to the Eastern Penitentiary, and to the Philadelphia County Prison. 1818 S. Rittenhouse Square.

1904. Skillern, Penn-Gaskell, M.D. 241 S. Thirteenth St.

1904. Smith, Allen J., A.M., M.D., Sc.D. (Penna. Coll.), LL.D. (McGill Univ.), Professor of Pathology and of Comparative Pathology, and Director of Courses in Tropical Medicine in the University of Pennsylvania. Medical Laboratories, University of Pennsylvania.

1905. Smith, S. MacCuen, M.D., Professor of Otology in the Jefferson Medical College; Aurist and Laryngologist to the Germantown Hospital; Aurist to the Jewish Hospital; Consulting Aurist to the Oncologic Hospital. 1429 Spruce St.

1919. Smyth, Henry Field, M.D. Wayne, Pa.

1908. Speese, John, M.D., Associate Professor in Surgery, Graduate School University of Pennsylvania; Instructor in Surgery in the University of Pennsylvania; Surgeon to the Children's Hospital; Assistant Surgeon to the Presbyterian Hospital. 2032 Locust St.

1895. Spellissy, Joseph M., A.M., M.D., Visiting Surgeon to St. Joseph's and to the Methodist Episcopal Hospitals; Assistant Surgeon to the Orthopedic Department of the University Hospital. 317 S. Fifteenth St.

1897. Spiller, William G., M.D., Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania; Neurologist to the Philadelphia General Hospital; Consultant Neurologist to the Pennsylvania Hospital. 4409 Pine St.

1894. Stahl, B. Franklin, B.S., Ph.G., M.D., Clinical Professor of Medicine in the Woman's Medical College of Pennsylvania; Associate in Medicine and Lecturer on Dietetics of the Sick in the University of Pennsylvania; Visiting Physician to St. Agnes' and the Philadelphia General Hospitals. 1727 Pine St.

ELECTED

1909. Starbuck, J. Clinton, M.D., Physician to the Orphanage, Orphan Society of Philadelphia at Wallingford and to the Glen Mills School, Glen Mills, Pa. 42 E. Washington St., Media, Pa.

*1875. Starr, Louis, M.D., LL.D. (Haverford). Care of Brown, Shipley & Co., London, England.

1912. Stauffer, Nathan Pennypacker, D.D.S., M.D., Laryngologist and Otologist to the Dispensary of the Presbyterian Hospital; to the Pennsylvania Hospital; to the Philadelphia General Hospital, Tubercular Department; to the Home for Crippled Children. 1819 Walnut St.

1910. Stellwagen, Thomas C., Jr., M.D., Chief Clinical Assistant in the Out-patient Surgical Department of the Jefferson Medical College Hospital. 200 Professional Bldg., 1831 Chestnut St.

1884. Stelwagon, Henry W., M.D., Ph.D., Professor of Dermatology in the Jefferson Medical College. 1634 Spruce St.

1895. Stengel, Alfred, M.D., Sc.D., Professor of Medicine in the University of Pennsylvania; Physician to the University Hospital and the Pennsylvania Hospital. 1728 Spruce Street.

1901. Stevens, Arthur A., M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine in the Woman's Medical College of Pennsylvania; Lecturer on Physical Diagnosis in the University of Pennsylvania; Physician to the Episcopal and St. Agnes' Hospitals. 314 S. Sixteenth St.

1902. Stewart, Francis T., M.D., Professor of Clinical Surgery in the Jefferson Medical College; Surgeon to the Germantown Hospital; Surgeon to the Pennsylvania Hospital. 311 S. Twelfth St.

1914. Stewart, Thomas S., B.S. (Univ. of Penna.), M.D. 301 S. Eighteenth St.

1898. Stout, George C., M.D., Professor of Otology in the Philadelphia Polyclinic and College for Graduates in Medicine; Laryngologist and Aurist to the Presbyterian Hospital, the Children's Aid Society, and the William Penn Charter School. 1611 Walnut St.

1884. Stryker, Samuel S., M.D., Physician to the Presbyterian Hospital. 3833 Walnut St.

*1900. Swan, John M., M.D. 457 Park Avenue, Rochester, N. Y.

1898. Sweet, William M., M.D., Clinical Professor of Ophthalmology in the Jefferson Medical College, and Ophthalmic

ELECTED

Surgeon to the Jefferson Medical College Hospital; Professor of Diseases of the Eye in the Philadelphia Polyclinic; Attending Surgeon to the Wills Eye Hospital. 1205 Spruce St.

1900. Talley, James Ely, A.B., M.D., Visiting Physician to the Presbyterian and Methodist Episcopal Hospitals; Consulting Physician to the Eastern Penitentiary. 4301 Spruce St.

1911. Taylor, Alonzo Englebert, M.D., Rush Professor of Physiological Chemistry in the University of Pennsylvania. 4522 Locust St.

1886. Taylor, John Madison, A.B. and A.M. (Princeton), M.D., Professor of Physical Therapeutics and Diatetics, Medical Department Temple University. 1504 Pine St.

1887. Taylor, William J., M.D., Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases, and to St. Agnes' Hospital; Consulting Surgeon to the West Philadelphia Hospital for Women. 1825 Pine St.

1886. Taylor, William L., M.D. 1340 N. Twelfth St.

†1910. Thomas, Benjamin A., A.B., A.M., M.D., Professor of Genito-urinary Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; Head of the Department of Genito-urinary Surgery, Presbyterian Hospital; Instructor in Surgery in the University of Pennsylvania; Surgeon-in-Chief to the Out-patient Department of the University Hospital. 116 S. Nineteenth St.

1867. Thomas, Charles Hermon, M.D. 3634 Chestnut St.

1912. Thomas, Frank Wister, A.M., M.D., Visiting Physician to "Buttercup Cottage;" Consulting Physician to the Germantown Hospital. 27 E. Mt. Airy Ave.

1907. Thomas, Thomas Turner, M.D., Associate Professor of Applied Anatomy, and Associate in Surgery in the University of Pennsylvania; Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the University Hospital. 2005 Chestnut St.

1896. Thorington, James, A.M., M.D., Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine; Ophthalmic Surgeon to the Presbyterian Hospital; Ophthalmologist to the Ellwyn, Pa., Training School for Feeble-minded Children. 2031 Chestnut St.

1898. Thornton, Edward Q., M.D., Assistant Professor of Materia Medica in the Jefferson Medical College. 1331 Pine St.

ELECTED

1912. Torrey, Robert G., M.D., Assistant Physician to the Philadelphia General Hospital; Physician to the State Tuberculosis Dispensary. 1716 Locust St.

1896. Toulmin, Harry, M.D. Haverford, Pa.

1908. Tracy, Stephen E., M.D., Gynecologist to the Stetson Hospital; Visiting Surgeon to the Gynecean Hospital. 1527 Spruce St.

1901. Tucker, Henry, M.D., Genito-urinary Surgeon to the Philadelphia General Hospital; Curator of the Academy of Natural Sciences of Philadelphia. 2000 Pine St.

†1894. Tunis, Joseph Price, M.D. 2017 Locust St.

1901. Turner, John B., M.D. 1833 Chestnut St.

1866. Tyson, James, M.D., LL.D., Emeritus Professor of Medicine in the University of Pennsylvania and late Physician to the Hospital of the University of Pennsylvania, and to the Pennsylvania Hospital. 1506 Spruce St.

1897. Tyson, T. Mellor, M.D., Physician to the Philadelphia General Hospital; Physician to the Rush Hospital, the Philadelphia Lying-in-Charity Hospital, and the Children's Aid Society of Philadelphia. 1506 Spruce St.

1907. Ullom, Josephus Tucker, M.A., M.D., Member of the Staff of the Henry Phipps Institute; Visiting Physician to the Chestnut Hill Hospital. 24 Carpenter St., Germantown.

1913. Vail, William Penn., B.S., M.S., M.D., Laryngologist to the Pennsylvania Institution for the Instruction of the Blind; Laryngologist to the Department for Tuberculosis of the Philadelphia General Hospital; Assistant Laryngologist and Otologist to the Out-patient Department of the Pennsylvania Hospital; Assistant Laryngologist to the Children's Hospital. 1906 Sansom St.

°1873. Van Harlingen, Arthur, Ph.B. (Yale), M.D., Emeritus Professor of Diseases of the Skin in the Philadelphia Polyclinic. 1831 Chestnut St.

1903. Van Pelt, William Turner, M.D. Consulting Ophthalmologist to the Episcopal Hospital. 1100 Widener Building.

1893. Vansant, Eugene Larue, M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic; Visiting Physician to the Throat, Nose, and Ear Department of the Howard Hospital. 1929 Chestnut St.

ELECTED

1912. Vaux, Norris Wistar, M.D., Surgeon to the Chestnut Hill Hospital; Surgeon to the Dispensary of the Germantown Hospital. 8901 Germantown Ave., Chestnut Hill.

*1897. Veasey, Clarence A., A.M., M.D. Suite 404, Paulsen Building, Spokane, Wash.

†1883. Vinton, Charles Harrod, A.M., M.D. P. O. Box 464, Atlantic City, N. J.

1903. Wadsworth, William Scott, M.D. 3914 Baltimore Ave.

1906. Walker, John K., M.D., Physician to the Children's Hospital of the Mary J. Drexel Home; Physician to the Out-patient Department of the Pennsylvania Hospital. 1915 Rittenhouse St.

1907. Walker, Warren, M.D., Dermatologist to the Episcopal and Howard Hospitals; Assistant Dermatologist to the Pennsylvania Hospital. 246 S. Twenty-second St.

1904. Walsh, Joseph, A.M., M.D., Visiting Physician to and Medical Director of the White Haven Sanatorium; Medical Director of St. Agnes' Hospital. 2026 Chestnut St.

1910. Ward, E. Tillson, A.M., M.D. 1415 S. Broad St.

1895. Watson, Arthur W., M.D., Professor of Diseases of the Throat and Nose in the Philadelphia Polyclinic and College for Graduates in Medicine; Laryngologist to the Jewish Hospital; Laryngologist and Aurist to the Mt. Sinai Hospital; Laryngologist to Home for Incurables. 126 S. Eighteenth Street.

1886. Watson, Edward W., M.D., Physician to the Magdalene Home. 38 S. Nineteenth St.

1903. Weber, Charles H., M.D., Physician to the Dispensary of the Children's Hospital. 2048 Pine St.

1906. Weisenburg, Theodore H., M.D., Professor of Neurology, Graduate School, University of Pennsylvania; Consulting Neurologist to the State Hospital for the Insane at Norristown and to the State Hospital for the Feebleminded and Epileptic at Spring City. 1909 Chestnut St.

1883. Welch, William M., M.D., Chief Diagnostician to the Bureau of Health, and Consulting Physician to the Municipal Hospital for Contagious Diseases; Consulting Physician to the Northern Dispensary and the Northern Home for Friendless Children. 1411 Jefferson St.

1913. Wells, P. Frailey, A.M., M.D., Ph.D. S. W. Cor. Fortieth and Brown Sts.

ELECTED

1897. Wells, William H., M.D., Assistant Professor of Obstetrics in the Jefferson Medical College; Assistant Obstetrician to the Jefferson Medical College Hospital; Pediatrician to the Willing Day Nursery; Pediatrician to the Charity Hospital. 1135 Spruce St.

1893. Westcott, Thompson S., M.D., Associate in Diseases of Children in the University of Pennsylvania; Pediatrist to the Methodist Episcopal Hospital; Consulting Physician, Haddock Memorial Home. 1720 Pine St.

1884. Wharton, Henry R., M.D., Surgeon to the Presbyterian and the Children's Hospitals; Surgeon to Girard College; Consulting Surgeon to the Bryn Mawr Hospital, the Chestnut Hill Hospital, St. Christopher's Hospital for Children, the Pennsylvania Institution for the Deaf and Dumb, and the Pennsylvania Institution for the Blind. 1725 Spruce Street.

1901. White, Courtland Y., M.D., Director of the Pathological Laboratories of the Episcopal Hospital; Pathologist to the Children's Hospital and to the Kensington Hospital for Women; Chief Bacteriologist to the Bureau of Health, Department of Health and Charities, Philadelphia. 1808 Diamond St.

1905. Whiteway, Harold M., M.D. 1924 Chestnut St.

1898. Whiting, Albert D., M.D., Surgeon to the Germantown Hospital; Assistant Surgeon to the Lankenau Hospital; Assistant Surgeon to the University Hospital; Instructor in Surgery in the University of Pennsylvania. 1523 Spruce Street.

1914. Willard, de Forest P., B.S. (Univ. of Penna.), M.D., Instructor in Orthopedic Surgery, University of Pennsylvania; Assistant Surgeon to the Orthopedic Hospital; Surgeon to the Home of the Merciful Saviour, Surgeon to the North American Sanitarium, Ventnor, N. J. 2108 Walnut St.

1907. Williams, Carl, B.S., M.D., Ophthalmic Surgeon to the Germantown Hospital; Instructor in Ophthalmology in the University of Pennsylvania; Ophthalmic Surgeon to the Pennsylvania Institution for the Deaf and Dumb. School Lane and Greene Sts., Germantown.

1915. Willits, Charles H., A.M., M.D., Medical Director of the Provident Life and Trust Company. 409 Chestnut St.

1916. Wilmer, Harry B., M.D., Assistant Instructor in Medicine, University of Pennsylvania; Assistant Visiting Physician

ELECTED

and Assistant Neurologist to the Germantown Hospital; Visiting Chief to the Dispensary of the Germantown Hospital. 138 W. Walnut Lane, Germantown.

1881. Wilson, H. Augustus, M.D., Emeritus Professor of Orthopedic Surgery in the Jefferson Medical College; Consulting Orthopedic Surgeon to the Philadelphia Lying-in Charity Hospital and the Kensington Hospital for Women. 1611 Spruce St.

1874. Wilson, James Cornelius, A.M. (Princeton), M.D., Emeritus Professor of the Practice of Medicine and of Clinical Medicine in the Jefferson Medical College; Physician-in-Chief to the Lankenau Hospital; Emeritus Physician to the Pennsylvania Hospital; Consulting Physician to the Bryn Mawr Hospital. 1509 Walnut St.

1902. Wilson, Samuel M., M.D. 1517 Arch St.

1897. Wilson, W. Reynolds, M.D. 1709 Spruce St.

1904. Wister, James W., M.D., Physician to the Out-patient Department of the Germantown Hospital. 5430 Germantown Ave.

*1901. Witmer, A. Ferree, M.D. Freeport, Long Island, N. Y.

1918. Wolferth, Charles Christian, M.D.

1893. Wood, Alfred C., M.D., Assistant Professor of Surgery in the University of Pennsylvania; Surgeon to the University, the Philadelphia General, St. Timothy's, and the Howard Hospitals. 2035 Walnut St.

1900. Wood, George B., M.D., Instructor in Laryngology in the University of Pennsylvania; Assistant in the Clinic for Diseases of the Nose and Throat at the Polyclinic Hospital. Bryn Mawr, Pa.

1865. Wood, Horatio C, M.D., LL.D (Yale, Lafayette and University of Pennsylvania), M. N. A. S., Emeritus Professor of Materia Medica and Therapeutics in the University of Pennsylvania. 4107 Chester Ave.

1903. Wood, Horatio C., Jr., M.D., Professor of Pharmacology and Therapeutics in the University of Pennsylvania. 1905 Chestnut St.

1880. Woodbury, Frank, M.D., Secretary to the Committee on Lunacy of the Board of Charities of Pennsylvania. 3345 N. Seventeenth St.

*1911. Woods, Andrew H., A.B., M.D. Cedar Rapids, Iowa.

†1897. Woodward, George, M.D. W. Willow Grove Ave., Chestnut Hill, Philadelphia.

ELECTED

1913. Woodward, W. Wellington, M.D. 26 S. Church St., West Chester, Pa.

1903. Worden, Charles B., A.M., M.D. 322 S. Sixteenth St.

1889. Young, James K., M.D., Professor of Orthopedic Surgery in the Philadelphia Polyclinic; Clinical Professor of Orthopedic Surgery in the Woman's Medical College of Pennsylvania; Associate Professor of Orthopedic Surgery in the University of Pennsylvania. 222 S. Sixteenth St.

1894. Zentmayer, William, M.D., Professor of Ophthalmology Graduate School of Medicine, University of Pennsylvania; Attending Surgeon to the Wills Eye Hospital; Ophthalmologist to the Glen Mills School. 1506 Spruce St.

1899. Ziegler, S. Lewis, A.M., M.D., LL.D., Attending Surgeon to the Wills Eye Hospital; Chief Ophthalmic Surgeon to St. Joseph's Hospital; Membre Société Française d'Ophthalmologie; Director of Public Health and Charities of Philadelphia. 1625 Walnut St.

1887. Ziegler, Walter M. L., A.M., M.D. 1418 N. Seventeenth St.

1895. Zimmerman, Mason W., M.D., Consulting Ophthalmic Surgeon to the Germantown Hospital. 1522 Locust St.

ASSOCIATE FELLOWS

(Limited to Fifty, of whom Twenty may be Foreigners)

American

ELECTED

1911. Abbe, Robert, M.D. 13 W. Fiftieth St., New York City, N. Y.

1909. Billings, Frank, M.D., 122 S. Michigan Boulevard, Chicago, Illinois.

1893. Councilman, William T., M.D., Harvard Medical College, Boston, Massachusetts.

1909. Crile, George W., M.D., 1021 Prospect Avenue, S. E., Cleveland, Ohio.

1909. Dana, Charles Loomis, M.D., 53 West Fifty-third Street, New York City, New York.

1892. Emmet, Thomas Addis, M.D., 91 Madison Avenue, New York City, New York.

1903. Gorgas, William C., M.D., U. S. A., Washington, D. C.

*1891. Jacobi, A., M.D., 19 East Forty-seventh Street, New York City, New York.

1912. McCaw, Lieut. Col. Walter D., M.D. Care of Surgeon-General's Office, Washington, D. C.

1909. Mall, Franklin P., M.D., 1514 Bolton Street, Baltimore, Maryland.

1906. Mayo, William J., M.D., Rochester, Minnesota.

1906. Pilcher, Lewis Stephen, M.D., 145 Gates Avenue, Brooklyn, New York.

1886. Reeve, John C., M.D., LL.D., S. W. corner Third and Wilkinson Streets, Dayton, Ohio.

1906. Shattuck, Frederick C., M.D., 135 Marlborough Street, Boston, Massachusetts.

1894. Warren, J. Collins, M.D., 58 Beacon Street, Boston, Massachusetts.

* Deceased.

1894. Weir, Robert F., M.D., 11 East Fifty-fourth Street, New York City, New York.
1892. Welch, William H., M.D., Johns Hopkins Hospital, Baltimore, Maryland.

Foreign

1890. Baccelli, Guido, Rome, Italy.
1908. Bannerman, W. B., M.D., General, I. M. S., 11 Strathearn Place, Edinburgh, Scotland.
*1899. Fraser, Sir Thomas R., M.D., LL.D., F.R.C.P., F.R.S., 13 Drumsheigh-Gardens, Edinburgh, Scotland.
1909. Macallum, Archibald B., M.A., M.B., Ph.D., Sc.D., LL.D., F.R.S., 59 St. George Street, Toronto, Canada.
1906. Myles, Sir Thomas, M.D., 33 Merion Square, W., Dublin, Ireland.
1898. Roddick, Thomas G., M.D., 80 Union Avenue, Montreal, Canada.
1908. Ross, Major Ronald, M.D., R.A., Liverpool School of Tropical Medicine, Liverpool, England.
1869. de Valcourt, Th., M.D., M.R.C. Phys., London. 64 rue de Drony, Paris, 17e France.

* Deceased.

CORRESPONDING MEMBERS

1880. Carrow, Flemming, M.D., 823 David Whitney Building, Detroit, Mich.
1885. Rendu, Jean, M.D., Lyons, France.
*1915. McIntire, Charles, M.D., Easton, Pennsylvania.
1916. Estes, William Lawrence, M.D., South Bethlehem, Pa.
1916. Guitéras, John, M.D., Havana, Cuba.
1917. Miner, Charles H., M.D., Wilkes-Barre, Pa.
1917. Stevens, Cyrus L., M.D., Athens, Pa.

* Deceased.

NECROLOGICAL LIST

FELLOWS

JAMES TYSON, M.D.,	February 21, 1919
WILLIAM H. WELLS, M.D.,	February 24, 1919
WALTER H. KREMER, M.D.,	March 15, 1919
H. AUGUSTUS WILSON, M.D.,	April 16, 1919
WILLIAM H. BENNETT, M.D.,	May 14, 1919
FREDERICK P. HENRY, M.D.,	May 24, 1919
J. EWING MEARS, M.D.,	May 28, 1919
HOWARD K. HILL, M.D.,	September 11, 1919
HENRY W. STELWAGON, M.D.,	October 18, 1919
NATHANIEL GILDERSLEEVE, M.D.,	November 11, 1919

ASSOCIATE FELLOWS

ABRAHAM JACOBI, M.D.,	July 10, 1919

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MEMOIR OF DR. FREDERICK P. HENRY[1]

By FRANCIS X. DERCUM, M.D.

Our late and distinguished Fellow, Dr. Frederick P. Henry, was closely and long associated with the College. He became a Fellow in 1884. In 1890 he was elected Honorary Librarian and was intimately identified with the work of the library until the time of his death. It is eminently fitting, therefore, that we should pause in the hurry and press of our lives to think of him, to review his career and to call to mind those charming personal qualities which rendered him alike esteemed and beloved.

Dr. Henry held the opinion, and so expressed it in his memoir of Dr. William S. Forbes, that "It is the duty of every man to bequeath to his family a personal record of the principal events of his life." While Dr. Henry did not carry out this thought in detail as regards his own life, he did prepare, in 1916, in response to a request, some "notes," as he termed them, for publication in a pamphlet containing biographical sketches of the members of the Class of 1866 of Princeton University. Fortunately he deposited a copy of these notes, in his own handwriting, in the library of the College. From these I venture to make the following quotations. Says Dr. Henry: "I was born July 21, 1844, on my grandfather's farm in the county of Middlesex, N. J., about a mile from the town of Cranbury. My parents' residence at that time was Mobile, Ala., but for several years they were in the habit of spending their summers in New York City (at 244 W. 22d Street and 100 Madison Avenue), with occasional visits to the farm. It was

[1] Read November 5, 1919.

during one of these annual visits that I was born. My first school was the Barton Academy of Mobile. My parents went abroad in 1854 on account of my father's health, and while they were absent I was placed under the care of the Rev. Joseph C. Wyckoff, a graduate of the "College of New Jersey" and of the Princeton Theological Seminary, and who is now (June 12, 1916) still living. I boarded in the same house with him at Cranbury, at about a mile distant from my birth place, and went to the school in that town, of which he was the sole instructor. Several of my schoolmates subsequently went to Princeton. Among them was William Lane, Calvin Holmes and William Mershon. The last mentioned was one of the most brilliant of Princeton's alumni.

"My father died on August 4, 1855, and a few months later I was sent to the West Jersey Collegiate School at Mount Holly, N. J., chiefly because my tutor, Mr. Wyckoff, had accepted the position of teacher in that institution, the head of which was the Rev. Samuel Miller, a well-known Princeton graduate. This school was, in one respect, very unlike the one at Cranbury, where Mr. Wyckoff was the sole pedagogue. At the Mount Holly School there were twenty-five boys (I can still call the roll of their names) and five masters, one to every five boys.

"In 1859 my mother took her family, my four sisters and myself, to Europe, where I spent about two years at schools in Dresden, Germany, and Tours, France. At Tours I was a pupil at the Lycée Impérial. We returned shortly before the beginning of the Civil War and took up our residence in Baltimore. I entered Princeton in August, 1862, and left when half through the Sophomore year. In the autumn of 1864 I went abroad alone, returning in February, 1865. I began the study of medicine in 1865 at the College of Physicians and Surgeons, New York, and received my degree of M.D. in March, 1868. Married Josephine B. Nancrede, of Philadelphia, in November, 1869, and have lived there uninterruptedly ever since.

"I was elected one of the physicians to the Episcopal Hospital of Philadelphia in 1874 and served until 1888. I was elected to the staff of the Philadelphia Hospital in 1888 and am now (1916) the senior physician to that institution. For a short period (in the

eighties) I was on the medical staff of the Jefferson College Hospital, and about the same time was professor first of pathology and later of clinical medicine in the Philadelphia Polyclinic. In 1891 I was elected professor of the principles and practice of medicine in the Woman's Medical College of Pennsylvania, and still hold that position. I have also been consulting physician to several hospitals. I am a Fellow of the College of Physicians of Philadelphia, a member of the Association of American Physicians, of the American Medical Association, of the Medical Society of the State of Pennsylvania, of the Philadelphia County Medical Society and of the Pathological Society of Philadelphia. Of the two last named I am an ex-President, and have been Honorary Librarian of the College of Physicians since 1890. In 1887 I was elected a corresponding member of the Royal Academy of Medicine at Rome, and in 1891 I received the honorary degree of Master of Arts from Princeton.

"My interests are not exclusively confined to medicine, as shown by the facts that I am a vestryman of St. Peter's Church, Philadelphia, a manager of Christ Church Hospital, which is not a hospital in the ordinary meaning of that word, but a home for indigent old ladies, and a director of the Musical Fund Society of Philadelphia. I am a member of the University Club of Philadelphia and of the Authors' Club, London.

"My contributions to literature, chiefly medical, have been numerous and varied, and consist of articles in encyclopedias, medical journals, native and foreign, editorials and reviews. A partial list of them may be found in the Index Catalogue of the Surgeon-General's Office at Washington. I have edited three books, namely, the seventh edition of Flint's *Practice of Medicine*, to which I contributed about one hundred pages of new matter, the *Standard History of Medicine in Philadelphia* (Chicago, 1897) and the *Founders' Week Memorial Volume* (Philadelphia, 1909) the last mentioned being a book of 912 pages."

Dr. Henry's contributions to medical literature cover a wide range of subjects. Naturally most of them deal with internal medicine, though trophic disorders appear to have had a special claim upon his attention. Among the more interesting papers

are those on Addison's disease and Raynaud's disease. He also described the second case of the trophic disorder which subsequently became known under the name of adiposis dolorosa. His writings were not, however, confined to medicine proper. Some of them are historical and biographical. One of them again deals in a most satisfactory way with that most interesting insect the bookworm, the Sitodrepa panicea. Others of his writings consist of memoirs and addresses. His historical sketch of the College of Physicians, published in the *New York Medical Journal* for November 13, 1909, will also be recalled with pleasure and satisfaction by many of the Fellows. Some of Dr. Henry's papers, it should be added, have been collected and are deposited in two attractive bound volumes in the library.

Among Dr. Henry's many activities was his long occupancy of the chair of the principles and practice of medicine in the Woman's Medical College of Pennsylvania. He was elected professor in 1891 and presented his resignation in February, 1917. He was, however, requested to continue teaching for another college session, at the end of which his health demanded his complete withdrawal. He served in all some twenty-seven years. His loss was keenly felt, and his colleagues passed a resolution expressing their sincere regret, and testifying to their high appreciation of his services and character.

The term of service of Dr. Henry in the office of Honorar Librarian of the College embraced the period of twenty-nine years, and during all of this time his interest in the library was unceasing and unflagging. The term "honorary" might perhaps be construed by those unfamiliar with the conduct of the library as implying that his duties were nominal and perhaps perfunctory. Far from this, however, are the actual facts. Among his duties was his attendance at the monthly meetings of the Library Committee. At these meetings the monthly report by him to the committee was a regular and formal part of the stated business. His presence was necessary and important, and that he was thoroughly familiar with all of the details of the administration and business of the library goes without saying. He was rarely—indeed, I might almost say, never—absent. He never allowed any other

matter to interfere with a meeting of the Library Committee. To him attendance at the meetings was an imperative obligation. He took an active part in the discussions, and his opinions and judgments concerning the various matters that presented themselves were always wholesome and wise. He took an active and warm personal interest in the selection and purchase of the books and journals. His knowledge of French, German and the classics, and not least his sense of historical values, stood him here in good stead. To him, further, each book made a personal appeal, To him, as he expressed it in his address at the dedication of this the new College Hall, books were "animate objects," real, living things. And his reverential attitude of mind was further revealed when he said: "We are the slaves of these books, not their masters. No man ever mastered a book. When thoroughly imbued with its spirit he is influenced by it for the remainder of his life. Who can say that he has mastered the Bible, or Shakespeare, or Homer, or Dante? But who has not been captivated, that is, enslaved, by one or all of them? We are the slaves of the book, and, through it, we have accomplished mightier miracles than were ever performed by the fabled slaves of the lamp."

His visits to the library were very frequent. He was closely in touch with it. In a sense he was identified with it. To him the post of Honorary Librarian was a trust which it was a moral obligation to fulfil. He shared with the Library Committee their anxieties concerning the safety of the books in the old College Hall, their anxieties regarding the safe transfer of the books to the new building, their anxieties regarding the care of the books in the new open stacks, and he took an active part in the solution of the problem to prevent the accumulation of dust and the soiling and deterioration of books in the stack-room.

In his personality Dr. Henry was kindly, modest and unpretentious. He was delightful to work with. What he said and did was always characterized by excellent judgment and was invested with a simple dignity that carried with it force and conviction. He will be very much missed especially by those who were associated with him, and he will be long remembered.

ANNUAL ADDRESS OF THE PRESIDENT[1]

By COLONEL RICHARD H. HARTE, M.C., U.S.A.

It has been a time-honored custom in this old institution that at each annual meeting the presiding officer should make a report in the form of an address, of the varying activities of the College during the year that has just past. The task is often a difficult one, even when one has been on the ground, present at all the meetings and in close touch with all the activities of the College during the year. In that way your presiding officer is in a position to reflect the sentiments of the College, which can only be acquired by association with the various officers and committees, who represent the working forces and on whom the success and failure have depended. On this occasion, however, the position of your presiding officer is unique in the history of the College. There is no record or precedent in which he has so consistently neglected the honor and the responsible duties conferred on him when elected to the post of President, three years ago. All that I can offer is to plead your indulgence in the extenuating circumstances incident to the Great War in which we suddenly found ourselves plunged.

If you remember in April, 1917, the commission from the Allies came to this country, headed by Mr. Balfour and General Joffre, asking for assistance, and, as Mr. Balfour specially requested, for medical aid. Prior to that time the Red Cross had organized a group of Base Hospitals in the different large cities, many of which were equipped and organized, ready for any emergency. As it happened, Base Hospital No. 10, one of the fortunate ones, which

[1] Read January 1, 1919.

was composed largely of members of the staff of the Pennsylvania Hospital, and at the same time of many of the most representative Fellows of the College, including members of the Council, chairmen of committees, as well as the Secretary, Vice-President and President. I will not mention the names of the group that composed the personnel of Base Hospital No. 10, nor those of the other splendid groups of hospitals in France that were largely composed of the Fellows of the College. They are well known to all the Fellows present, and the subsequent record which they made while working and taking charge of large A. E. F. hospitals has justly shed luster on the profession in Philadelphia, and particularly on our beloved College. I cannot help feeling that we are not a little indebted to the influence of our dear Osler (Sir William Osler) who never lost an opportunity to do us a favor with the very large group of the English medical profession with whom he was so intimate and held in such great respect.

However, I feel that I am voicing the sentiment of that splendid group of Fellows when I say that we all felt fortunate that our lot had been cast with the British Expeditionary Force, and also to find one of the best-equipped and largest hospitals in France turned over to us to operate and maintain. The responsibility was great. The eyes of the R. A. M. C. (Royal Army Medical Corps) were upon us, watching our movements eagerly, both from a civil and a military point of view, but at the same time on the alert to render us any assistance or advice that we might need. It was not long before the A. E. F. began to come to France in large numbers, and they in turn made inroads on our personnel for important positions as consultants and specialists, which positions they have filled up to the present time, with great credit to themselves and indirectly to the College. And here I want to pay tribute to the patriotism of the Fellows who gave their services to their country. Words fail me when I recall the sacrifices so many of the Fellows of this College have made to do their duty as they saw it. When one studies the sacrifices that many individuals have made from all points of view you begin to recognize what the splendid generosity and latent bravery of the medical profession really means. When I

speak of latent bravery I mean the indescribable something that impels a man to do his duty under all circumstances, all conditions, regardless of consequences, without any of the excitement of conflict which is incident to other branches of the military service. Many of our Fellows remained at their post of duty oblivious to all surroundings, quietly performing their duty, regardless of all conditions, except that of alleviating suffering as they found it. An example of this was given by a young officer who joined our unit some months ago. He was down with the Guards' Division, which was being heavily gassed. A shell exploded, killing and wounding many men. He found it impossible, with his mask on, to render adequate assistance, particularly in the control of hemorrhage, vision through a gas mask being next to impossible. Well knowing the risk entailed in the removal, he took off his mask, plugged his nostrils with cotton and retained the respirator so that he could breathe through his mouth. In this manner he managed to do his work and attend to the wounded in a way which would have been impossible if the mask was in place. Here the risk was great, but duty and loyalty to his profession and the patient committed to his care were first. He saw the light as hundreds in the profession have seen it before, and without weighing the cost, threw all personal risks aside, deliberately and knowingly exposing himself to one of the greatest and surest of dangers. Incidentally, I am pleased to state that the British Government, appreciating this devotion to duty, awarded him the Military Cross and requested that he go to London for the personal investment by the King.

I trust that you will pardon this digression. I mention it simply to illustrate a type of the work done by our profession of a character that the public little believe emanates from members of a non-combatant force.

It is interesting to see how much the spirit of self-sacrifice, loyalty and patriotism has affected the membership of the College. Of the 400, many of whom are long past military age, nearly 50 per cent. were engaged in various activities of war work, a large number of them overseas. It is needless for me to expatiate on the manner in which they performed their duties. This is demon-

strated in the matter of promotions, from time to time, to the highest grades in the medical service. As in the Civil and Spanish Wars, we find the Fellows of the College responding to the patriotic spirit. It is safe to say that when their services are again required by the Government the Fellows will make the same generous response that we found in the spring of 1917, dozens of them helping in forming and equipping Base Hospitals, ambulance trains and filling all the various places of responsibility which go to form a great army medical corps.

Thanks to the large leaven of the civil medical profession, abuses were headed off and many of the scandals incident to the Spanish War were prevented. Old customs and traditions of the A. M. C. were in many cases abolished, as, for instance, the doing away with the so-called ward master (an orderly in charge of the ward nursing) and the substitution of a skilled trained nurse. This resulted in our wounded and sick receiving nursing care and attention such as they had never received at any time in the history of the Government. Nevertheless, many foolish prejudices remained and worked to the disadvantage of our men. The worst trouble of all was the inability of the Government to visualize and to profit by the mistakes of other armies, and begin activities where the other nations had left off. The great group of Fellows of this College and the army of civil surgeons helped immensely by being able to see the light and go directly to it without the circuitous methods incident to the regular trained officer of the A. M. C., whose idea of duty is largely confined to making out long and complicated records, the outgrowth of years of inactivity of peace time.

I trust that you will pardon these digressions while I pass to consider some of the routine work of the year.

Scientific Business. The number of papers read at the meetings reached the total of only twenty-one, fifteen of these being read by gentlemen not Fellows of the College. While the number of papers is small, all were of unusual interest. Through the efforts of the chairman of the Committee on Scientific Business, Major Richard S. Pearce, a number of timely topics of importance and

value in connection with the War were discussed by officers of the Medical Reserve Corps, of the Medical Corps of the National Army and of the United States Army, as well as by members of the Rockefeller Institute. The attendance of Fellows at these meetings averaged but thirty, a decrease of twenty from last year, easily accounted for by the absence of so many Fellows on war duty and the excessive demands on the time and energies of those who remained at home. The audiences at the meetings were always happily augmented by a number of guests. A special meeting of notable interest was held on the evening of November 5 in honor of the delegation of foreign surgeons who had come to this country as the official delegates of their respective governments to the Clinical Congress under the auspices of the American College of Surgeons. The sixty-eight Fellows of the College who, with a large audience of guests, filled Mitchell Hall, had the pleasure of hearing the subject of the treatment of chest wounds and wounds of the lungs presented ably and most instructively in a series of discussions by Major Pierre Duval, of Paris; Colonel George E. Gask, of London; Professor Raffaefe Bastionelli, of Rome; Colonel Sir Thomas Myles, of Dublin, and Major G. Gray Turner, of Newcastle-on-Tyne.

During the year but one memoir of a deceased Fellow was read. At the October meeting a most admirable sketch of the late Dr. Samuel G. Dixon, written by Dr. James M. Anders, was read by Dr. M. H. Fussell.

To the collection of portraits a much appreciated addition was made in the gift of a painting of the late Dr. Harrison Allen. The presentation was made on behalf of the donors by Dr. George A. Piersol.

Other gifts received consisted of various interesting curios and manuscripts which were presented through the Library Committee and the Committee on the Mütter Museum, and of which proper acknowledgment was made.

Of the various Lectures established by the College—the Hatfield, the Mary Scott Newbold, the "Public Lectures"—none were given during the year, it being deemed inadvisable, under existing

war conditions, to attempt them. For similar reasons the Weir Mitchell Oration was also deferred. It was found, too, by the Committee on the Mütter Museum, impossible to secure any one free to undertake the usual Mütter Lecture. It is to be hoped that with the gradual return to a more normal state of affairs the College will soon find the occasion ripe for a resumption of some, and finally all of these annual lectures.

Finances. The financial affairs of the College, which are in an entirely satisfactory condition, have received the most unremitting care and attention of the Committee on Finance, headed by its capable Chairman, Dr. George Fales Baker, and of the Treasurer, Dr. Charles W. Burr. To them is due appreciative acknowledgment by the College for their faithful and efficient discharge of duty.

The Treasurer's report for the year shows the total valuation of real estate belonging to the College to be $561,091.16; of securities, $462,629.27; cash on deposit, $42,631.58; making the total assets $1,066,352.01. A copy of this report, showing all details, is kept in the office and is open to inspection by any Fellow of the College. All the accounts have been audited by an expert accountant, who reports them to be correct.

In order to safeguard the interests of the College at its building and property at Thirteenth and Locust Streets, as they might be involved by the placing of a subway station at that point, the Treasurer was authorized by resolution, with the approval of counsel, to employ an architectural engineer; and also counsel was instructed to take such steps as would be necessary to assure the College of compensation by the city for financial loss sustained.

Library. From the very interesting report of the Library Committee we learn that the total number of volumes in the Library is 120,895, of which 9518 are unbound volumes. Of pamphlets unbound there are 98,899. Reserve or second copies of some of the more important periodical publications, reach the total of 3527 volumes, and are included in the above figures, as are also 2983 more or less incomplete volumes. Of duplicates, not included in the above count, there are 6213.

From all sources there were received during the year 2190 volumes, 9100 pamphlets and 12,309 numbers of periodicals. The total increase in the number of volumes is 1728. Among 780 new publications added are 47 of which Fellows of the College are either authors or editors.

Individual donors numbered 408; distinct presentations, 828.

As to current periodical publications received there has been a further decrease from that noted in the report of the previous year. In the number of American publications received there has been a marked decrease, while a number of foreign periodicals have given notice of cessation of publication. The committee tells us that two years of persistent effort on the part of the Committee on Publication of the American Library Association have resulted in the receipt in New York late in 1918 of four shipments of German periodicals, from which our Library, having coöperated in the efforts, received 285 numbers, chiefly for the years 1917 and 1918.

Ninety-seven dissertations from foreign universities were received during the year.

For the War Volume of Photographs of Fellows in the service of the Government, forty-eight were received.

INCUNABULA

The present number of Incunabula is 234 titles, 221 volumes, the additions during the year being 10 volumes, as follows:

de Gorinchem, Henricus. Tractatus de superstitiosis. [Esslingae, Fyner, 1472.] [Hain-Copinger 7807.]
Manuscript notes.
Fund for Rare Books.

Gorus, Joannes de Sancto Geminiano. [Summa de exemplis et similitudinibus rerum.] Basle, Froben, 1499. [Hain 7546.]
Fund for Rare Books.

Harderwyck, Gerardus. [Epitomata seu reparationes totius philosophiae naturalis.] Colonia, Quentell, 1496. [Hain 8362.]
First edition.
Fund for Rare Books.

[Lumen animae seu liber moralitatum.] [Reutlingen, Greyff, 1479.] [Hain-Copinger 10331.] Fund for Rare Books.

Mensa philosophica. [Coloniae, Guldenschaaf, Circa 1485.]
Manuscript notes.
Fund for Rare Books.

Platina, Bartholomaeus. De honesta voluptate, et valetudine. Civitate Austrie, Gerardi, 1480. [Hain 13052.]
First book printed in Cividale.
Fund for Rare Books.

Rustichelli, Pietro Torrigiano. [Commentum in Galeni librum, qui Microtechni intitulatur.] Venetiis, Bonetus Locatellus, 1498 [Hain 15684.] Fund for Rare Books.

Aristoteles. Tractatulus propleumatum. [Leipzig, Kachelofen], 1494. [Hain 1732.]
Excessively rare, as are all the XVth century editions of medical "secrets," which the middle ages ascribed to Aristotle. Very fine copy.
Fund for Rare Books.

Auctoritates; Aristotoles, Senece, Boetii, Platonis, Apulei, Affricani, Empedoclis, Porphirii et Guilberti Porrintani. [Printed in some French Provincial town before 1500.]
Unrecorded work from unknown French press. Pellechet has other editions, but not this one.
Fund for Rare Books.

[Chiromanthia.] Venice, Ratdolt [Circa 1480]. [Hain-Copinger 4971.
First edition.
Fund for Rare Books.

The additions to the Library include a long list of works of special interest, as well as a number of notable and more or less valuable autograph letters.

To the Library Endowment Funds there has been added the sum of $7433. The total amount of these various Funds is now $327,858.92.

The statistics showing the use made of the Library during the year plainly reflect the effect of war conditions. The number of

visitors was 3050, a decrease of 814 from the number in 1917 and 2860 less than two years ago. The number of visits by Fellows was 1196, an increase, curiously, of 80 over the total for 1917.

In the evenings on which the Library was open—two each week, except during the summer, seventy-eight in all, the number of visitors was 314; visits by Fellows, 96. These figures are less than those for 1917 by 186 and 36 respectively. Of visitors on the lesser legal holidays there were 51, one more than in the previous year, while 11 Fellows made visits on those days, the same number as in 1917.

In the number of books supplied on request for consultation in the Library we find a decrease, needing, of course, no explanation. In 1918, 6892 books were asked for; in 1917 the number was 10,764 —a difference of 3872. The number of books taken out was 2106, less by 1344 than in 1917, and 2427 less than in 1916. Lastly, the count kept of the daily average number of volumes used in the study rooms shows also a proportionate decrease.

The work of revising the catalogue has been kept up, and progress, too, has been made in the taking apart of bound miscellaneous pamphlets and subject-heading and arranging the pamphlets. The committee has wisely decided to defer the binding of these until the return of normal conditions after the War shall effect a reduction from the present high cost of such work.

The completion, early in the year, of the alterations in the Bookstack, begun in 1917, is a cause for congratulation. With the windows now sealed by brick and mortar, and an apparatus installed for ensuring thorough ventilation with washed air, the protection of the books from damage by dust is made as nearly perfect as is possible, since none can enter the stack except that taken in by Fellows and attendants. Moreover, the books will hereafter be spared from the wear and tear incident to repeated cleaning by hand, for the small amount of dirt which reaches them can with ease, and without damage to them, be thoroughly removed by the use of the vacuum cleaner at determined intervals.

The Committee of Publication. The volume of Transactions of the College, being Volume XL of the third series, in

the production of which the editor met with many difficulties incident to the general disturbed state of affairs, was not distributed until the early autumn. It is of about the usual size, containing besides the papers read before the College those also which were read in the Sections on Ophthalmology, Otology and Laryngology, Industrial Medicine and Public Health.

The Committee of Publication suffered a serious loss in the death, in June last, of its efficient chairman, Dr. Gwilym G. Davis.

The Hall Committee's Report tells of a year's work beset with difficulties, but successfully overcome. Not only was the vexing problem of securing competent labor to be solved, but the restrictions placed by the Fuel Commissioner on light and heat were the source of much anxiety, and demanded the exercise of incessant vigilance. Especially trying was the protracted period of frigid temperature early in the year, at a time when the general fuel supply was at an alarmingly low ebb. Observance of rigid economy in the use of our limited supply of coal, and compliance with an order of the Fuel Commissioner for certain lightless nights, made it necessary to limit the number of evenings on which the College Building might be open to two in the week—Wednesday and Thursday. The committee was, in consequence, obliged to arrange with the various societies, as well as our own Sections and Council, whose meetings were set for other evenings, to make changes to conform with this unavoidable and necessary restriction. While naturally no little inconvenience resulted, satisfactory adjustments were willingly made. This plan is still in effect and must continue until an assured supply of sufficient fuel to permit more liberal use is at hand.

The committee reports the building to be in excellent condition, although the practice of economy and the scarcity of labor have limited repairs to those only which were urgently needed. The chief expenditures have been for fuel and wages. Advanced cost of both have made commensurate demands on the funds appropriated to the committee, and will have to be met by a larger appropriation for the coming year and for so long a time thereafter as the present abnormal prices of these commodities shall last.

The Report of the Committee on the Mütter Museum shows that while, owing to the prevailing state of affairs, the number of additions to the collection was below the annual average, the number of visits to the Museum was greatly increased. Many medical officers of the army and navy availed themselves of the opportunities offered for observation and study in this very important department of the college. The committee hopes to be able to secure some specimens obtained at the war front for addition to the collection.

The omission of the Mütter Lecture for 1918, because of the inability of the committee, after repeated efforts, to secure a lecturer, has already been alluded to.

The Report of the Committee on the Directory for Nurses is especially interesting. The affairs of this committee, two of the members of which were absent on war duty throughout the year, were cared for by its able Chairman, Dr. Thomas G. Ashton, alone, until the latter part of October, when he entered the service of the Red Cross for foreign duty. To provide for the care of this very important branch of the College, your Acting President requested authority, which was granted by resolution of the College, to appoint a temporary committee and selected as its members, Dr. James V. Ingham, chairman, Dr. James C. Wilson, and Dr. Elliston J. Morris. In this committee the College is fortunate in having the services of two members whose previous long experience on the standing committee in the Directory made then especially fitted for the task which they willingly assumed. This temporary committee will continue in charge until the members of the elected standing committee shall return from Government service.

The Annual Report, made by Dr. Ingham, chairman of the temporary committee, tells of a very successful year, although the resources of the Directory, which in its administration continues to enjoy the services of its experienced Secretary and her assistant, were throughout taxed to their utmost. The total number of nurses on the registry is 588, of whom 480 are women nurses, 11 are certified nurses, 43 male nurses and 54 are classed as attendants. It is estimated that 200 of the nurses are absent on war service.

The number of calls filled during the year is 3344; the daily average number of nurses available, 29.

During the memorable epidemic of influenza, from September 27 to October 31, 1918, the total number of calls for nurses was 2955, of which the Directory was able to fill only 197, and in these cases could supply but 86 from its own list, having for the remaining 111 to obtain nurses elsewhere, as best it could.

The financial condition of the Directory is entirely satisfactory, and the Committee was able, after meeting its expenses, to make, as in former years, a substantial contribution to the Library.

The Committee on Public Health and Preventive Medicine was called upon to consider and report on a resolution of the Board of Health requiring the reporting by practitioners of cases of certain venereal diseases applying for treatment, approval of which resolution was requested of the College. After conference of a committee of the Council with the Director of Health and Charities, a report was made to the Council and then to the College, which resulted in the adoption of a motion that the resolution of the Board of Health be not approved as worded.

Another matter, and one of far-reaching importance, that was referred to the committee for consideration was the withdrawal by the American Red Cross of its appropriations to the army, the navy, and the public health service for animal experimentation in connection with the medical and surgical work of these branches of the service.

In its report the committee submitted to the College preambles and resolutions which were unanimously adopted by the College, pointing out the debt owed by the science of medicine to animal experimentation and biological research in the development of the field of preventive medicine as well as of treatment; expressing the deep regret with which the College learned of the withdrawal by the American Red Cross of its appropriations for this purpose; and stating that, by this action, the American Red Cross "had adopted a policy prejudicial to the best interests of our soldiers and sailors at the most critical period of our history." These resolutions, by order of the College, were sent to the President of the American Red Cross.

In the observance of an occasion designated as "Public Health Day," May 1, last, the Committee on Public Health was authorized to participate with other scientific and professional bodies at public exercises held in the Academy of Music.

The committee further served the College by taking charge of the preparation of the programme of the scientific business at our October meeting.

The Committee on Entertainments, represented by its chairman, Dr. Francis W. Sinkler, alone (the other members being absent on war duty), arranged for a reception and luncheon which the College had the pleasure of giving on Christmas Day, 1917, for members of the Medical Reserve Corps, and of the Medical Corps of the Army and of the Navy then stationed at Philadelphia for instruction or on other duty. It was a happy thought that inspired the occasion, which, thanks to the well-planned arrangements made with a nearby hotel, was very successful, and no doubt helped to bring cheer into an otherwise dreary day for more than a few good fellows, who in obedience to the call of duty were separated from their homes and their friends.

Sections. The work of the Sections of the College was very decidedly curtailed in consequence of the absence of many members on war duty. The Section on Ophthalmology reports that it held seven meetings during the year, with fairly good attendance. The Section on Otology and Laryngology held but five meetings. The Section on General Medicine made no report; while that on Medical History reported "that most of the men interested in the subject are in the service of the Government, and away." As of this latter section, Dr. Charles W. Burr, at the November meeting of the College, read a paper of high merit and compelling interest, entitled, Jean Paul Marat, Physician, Revolutionist, Paranoiac."

Council. The Council has discharged its duties with thorough care and appreciation of its responsibilities. Business from the Standing Committees, as well as that referred from the College, has received prompt consideration, and action upon all this, as well as on other matters originating in the Council, has been referred to the College with recommendations. The Council acted upon such

propositions for Fellowship as from time to time came before it, and all the candidates recommended by the Council have been elected by the College. Pursuant to a resolution adopted by the College, on recommendation of the Council, it has approved the remitting of payment of the annual contribution of a number of Fellows absent on active war duty who felt it desirable to request such action.

Membership. On December 1, 1917, the number of Fellows of the College was 466; of Associate Fellows 27, 17 of them being American and 10 foreign; of Corresponding Members 6; making a total of 499. During the year the College lost 9 Fellows—7 died, 1 resigned and 1 forfeited his Fellowship. The number of Fellows added by election was 7. The net loss was 2.

One new Corresponding Member was elected. The summary of the roll of the College on December 1, 1918, is as follows:

Fellows		464
Associate Fellows,		
American	17	
Foreign	10	27
Corresponding Members		7
		498

Of the Fellows, 425 reside in Philadelphia, or in its immediate vicinity in Pennsylvania, while the remaining 39 are non-residents.

The following are the Fellows lost by death during the year:

Thomas J. Mays died on February 14, 1918, at the age of seventy-two years. He was a graduate of the Jefferson Medical College in the year 1848 and was elected a Fellow of the College of Physicians in October, 1885. Dr. Mays, for a number of years, was Professor of Diseases of the Chest and Experimental Therapeutics in the Philadelphia Polyclinic and was also visiting physician to the Rush Hospital. Faithful in the discharge of his hospital duties and a good teacher, he attained prominence as a frequent contributor to the medical journals, chiefly upon the subject of pulmonary consumption.

Samuel Gibson Dixon, elected a Fellow in November, 1891,

died at the age of sixty-seven years, on February 26, 1918. An excellent memoir of Dr. Dixon, written by Dr. James M. Anders, was read at the meeting of the College last October.

Dr. Dixon was one of the most widely known Fellows of the College. He was the first Commissioner of Health of the Commonwealth of Pennsylvania and held that office at the time of his death. In that responsible position he showed distinguished ability.

Among other offices which he held were President of the Academy of Natural Sciences of Philadelphia; Vice-President of the Zoölogical Society of Philadelphia and a member of the Wistar Institute of Anatomy of the University of Pennsylvania.

Early in his medical career he became interested in experimental work in bacteriology and wrote a number of papers on various subjects in that field of science. His later contributions were devoted to matters connected with hygiene and sanitation.

Before entering upon the study of medicine Dr. Dixon had studied law and was admitted to the Philadelphia Bar.

In the affairs of the College he was always interested and for a number of years served as a member of the Committee on Finance.

Harry Clement Welker, elected a Fellow in February, 1916, died, at the age of thirty-nine years, in the Walter Reed Hospital, at Washington, on May 2, 1918. At the time of his death he held a commission of Captain in the Medical Reserve Corps, and was on active duty when seized with his fatal illness.

Captain Welker's home was in Norristown, Pa. He was surgeon to the Charity Hospital there and also consulting surgeon to the Norristown Hospital for the Insane. His death in the very prime of life, with a future of promise and opportunity before him, is deeply to be deplored.

William Constantine Goodell died on May 14, 1918. He was fifty-six years old, and a graduate in medicine of the University of Pennsylvania. He was the son of the late Dr. William Goodell, first Professor of Gynecology in the University of Pennsylvania, a distinguished Fellow, who for a long time was one of the Censors of this College. The younger Goodell was elected a Fellow in 1893.

For a number of years in his early professional life he was Clinical Instructor in Gynecology in the University of Pennsylvania and Assistant Gynecologist to the University Hospital. Later he relinquished these posts and for some time preceding his death he was not active in professional work.

Gwilym G. Davis died of pneumonia, after a brief illness, at his camp at Seboamock, Me., on June 16, 1918, at the age of sixty-one years. He became a Fellow of the College in January, 1889, having graduated from the University of Pennsylvania in 1879.

After serving a term as resident at the Pennsylvania Hospital, he spent some time abroad in study. On his return he received hospital appointments as dispensary surgeon and soon exhibited not only talent, but the tireless attention to detail, as well as that investigating bent of mind which characterized his work throughout life. His natural desire to teach was given opportunity in an early appointment as an instructor in surgery in the University. He was a successful teacher and later became Associate Professor of Applied Anatomy, and finally, in 1911, was chosen to fill the chair of Orthopedic Surgery. For a number of years Dr. Davis was a visiting surgeon at the Episcopal Hospital and also at St. Joseph's Hospital, and, in addition, was surgeon to the Orthopedic Hospital and Orthopedic Surgeon to the Philadelphia Hospital. On his election to the professorship of Orthopedic Surgery in the University of Pennsylvania, Dr. Davis relinquished all his work in general surgery and thenceforth devoted himself to orthopedics as a specialty.

A student by nature, Dr. Davis found himself unable to fully gratify his inclinations in this country and made more than one trip abroad for this purpose. As results of his work there he obtained the title of M.R.C.S. England and the degree of M.D. at Göttingen.

He was, as well, an industrious writer, and in addition to numerous articles and papers he was the author of an excellent and creditable work on *Applied Anatomy*, and some years ago wrote a very successful book on *Bandaging*.

He was a member not only of most of the local societies but of a

number of others, as the American Surgical Association, the American Orthopedic Association and the Society of Clinical Surgery.

Dr. Davis was always an active and interested Fellow of the College. A number of his papers he read here, and often with characteristic earnestness, took part in the discussion of the papers of many other Fellows. He was elected a member of the Committee of Publication in 1893, and two years later became its chairman, an office which he continued to hold until the time of his death, discharging his duties with marked fidelity as well as unusual ability.

Alfred Reginald Allen, Major, 314th U. S. Infantry, killed in battle northwest of Verdun, France, on September 30, 1918. He was forty-two years of age. He graduated in medicine at the University of Pennsylvania in 1898 and was elected a Fellow of the College in December, 1903. Before studying medicine he was educated at Lehigh University.

In medicine, Dr. Allen's chosen specialty was neurology, in which he attained notable distinction, both as a teacher and a writer. He was Lecturer on Neurological Electrotherapeutics and Instructor in Neuropathology in the University of Pennsylvania. His literary contributions covered many topics in neurology, both clinical and experimental, and in a work entitled *Surgery of the Spine and Spinal Cord,* by Dr. Charles H. Frazier, he was a collaborator.

He was actively interested in many societies, being a member of the American Psychopathological Society, and for two terms its President; of the American Neurological Association, being secretary and treasurer from 1909 to 1917; of the Philadelphia Neurological Society, of which he was president in 1910. He was secretary of the United States delegation to the 16th International Medical Congress, at Budapest, in 1909, and was United States delegate, as well as secretary of the delegation, to the 17th International Medical Congress, held in London, 1913.

On the entrance of the United States into the great European War in 1917, Dr. Allen's keen desire to do his part led him to give his services, not in the field of medical work, but in the fighting

force. He entered the Infantry School of Arms at Fort Sill and made good. Receiving his commission, he was assigned to the 314th Infantry, and with his regiment was sent to France. Earning promotion he was made a major. In the fighting northwest of Verdun, on September 30, 1918, leading his command, Major Allen was instantly killed. His loss is a sad one, his example inspiring. A more adequate account of the life of this accomplished and courageous Fellow of the College will be presented in a memoir to be prepared by one of the Fellows and read in the near future.

Isaac Norris died at Florence, Italy, on October 22, 1918, in the eighty-fifth year of his age. A graduate of the Arts Department of the University of Pennsylvania in 1852, he received his Master's Degree later, and, in 1858, M.D., from the same institution. In the Civil War he was an acting assistant surgeon. Afterward he was for ten years Professor of Chemistry in the Central High School of Philadelphia and for a time was physician to the Philadelphia Dispensary.

Dr. Norris was a member of the Academy of Natural Sciences, of the American Philosophical Society, the Franklin Institute and of the Historical Society of Pennsylvania. He was elected a Fellow of the College in April, 1865. To the office of Secretary he was elected in 1885, and with great fidelity occupied that post until 1891. For many years preceding his death he resided abroad.

It is only fitting that at this time some note should be made of the death of Frank Perley Prichard, Esq., who has been our legal advisor for so many years. Mr. Prichard was born in Charlestown, Massachusetts, May 30, 1853, and died at Grand Canyon, Yellowstone Park, August 29, 1918. He was one of the most distinguished members of the Philadelphia Bar and was for a long time a partner of the late John G. Johnson. It is impossible to express the debt that we owe Mr. Prichard during a long period of years in which he gave us legal advice in such a quiet way, guarding us from the many difficult problems incident to the ownership of semipublic real estate, and it will be very hard for us ever to find any person to fill the position which he occupied with such distinction.

As to business transacted by the College at its meetings, allusion to some of which has already been made in connection with the review of the reports of the Standing Committees, passing mention may here be made of one or two items. At the April meeting a resolution was adopted approving the Owen-Dwyer bill, then before Congress, for increased rank of officers of the Medical Reserve Corps. At the June meeting resolutions were adopted expressing the approval of the College of the plan of the Surgeon-General of the United States Army for the proper preservation in the Army Medical Museum of specimens received from the battle fronts of Europe, and stating the belief, shared by competent authorities, that for the enlargement and maintenance of the museum provision should be made by an adequate appropriation by Congress. Copies of these resolutions were forwarded to the proper committees of the Senate and the House at Washington.

A final word. Of the work and the affairs of the College for its last year, my account of which is now ended, it seems fair to say that while our activities have been naturally, under prevailing conditions, restricted, yet in the circumstances the year may be accounted a successful one.

It would be remiss in me if I failed at this time to express our appreciation of the valuable services rendered by our Librarian, Charles P. Fisher, and also by Miss Zelner, our bookkeeper, who has so efficiently taken care of our accounts, not only this year, but in years past. Due to these two valuable members, many of the small and irritating conditions which are so apt to arise in the management of a large institution never came to the ears of many of the committees, but were skilfully taken care of. I therefore wish to express our appreciation of their splendid coöperation at all times.

In terminating this address, I should feel remiss if I failed, before closing, to draw attention to some of the proposed changes and recommendations suggested at a previous meeting. The changes proposed are not especially radical, but, nevertheless, are indications of the spirit of unrest which is affecting the world at large and especially certain portions of Russia and Germany—the desire

to drag, to pull down, to change without definite reason, to cast aside methods that have stood the test of time and which have been such a factor in building up and placing the College on a stable foundation, with a policy so liberal and so broad that every member of the profession, whether a Fellow or not, can share in the wealth of learning that the older Fellows have gathered, collected and put in a tangible form, at the same time guarding these benefits as our priceless treasure, of which every Fellow is a part owner. If this spirit of unrest is permitted to invade and take over the reins of government the time will not be far distant when we can look back and see the result of a wild and suicidal policy and the havoc that it has wrought not only abroad, but at home. Again, I must call your attention and emphasize, in the strongest way, the inopportune time this is to enact some of the proposed changes in the By-laws. The number of Fellows present is necessarily unusually small, as a great group of our Fellows are abroad in the service of their country. If, after due deliberation and careful thought, it is the opinion of the majority of the College that the proposed changes are advisable and necessary, I am the last person to offer any objection; but as your presiding officer for the time, though short, I protest most vehemently against making any change of any kind, no matter how trifling, at this time when such a large number of the Fellows are overseas or on duty with the troops in different parts of the country. To any fair-minded and conscientious Fellow the position of the College is a most sacred one, left as it is with everything that it possesses by the large group on overseas duty. For the home group to consent to any changes or alterations which will affect the College management is, to my mind, a base betrayal of this sacred trust, which I feel sure is contrary to the intention of a vast majority of the Fellows. The desire for change has probably been fostered by that old obsession which persistently attacks some members relative to the lowering of our requirements for admission, so that our membership shall suddenly be doubled. In cities like London, Paris and New York, with a population twice or three times that of Philadelphia, such a thing is possible, but here such a thing is impossible except with

standards lowered in every way. I feel that this altruistic idea is contrary to the ideals and wishes of the College. By maintaining our present methods of management, no person in the profession, whether deserving or otherwise, is prohibited from sharing and partaking of the advantages the College offers for medical research and study.

Over a long period, twenty years, in which I have sat in the Council, never has a desirable name been persistently rejected. Instances may possibly have arisen when a desirable candidate has failed to receive the requisite number of favorable votes to election. If an error of overconscientiousness has been committed it can always be easily rectified in one year's time. Overcaution may lead to some heartburnings, but, as before stated, these are easily corrected.

Before closing I wish to call your attention to three names on our list of Foreign Associate Fellows, two residing in Berlin and one in Prague, Bohemia. These Associate Fellows are:

Paul Lazarus, M.D., of Berlin; Prof. Wilhelm Waldeyer, M.D., of Berlin; Rudolf von Jaksch, M.D., of Prague, Bohemia.

Residents of a nation with which we have been at war, and representing a class of which we have disapproved, at no time have they protested or raised their voices against the many abuses, and, I may say, crimes against humanity, practised by their respective Governments, such as the inhuman treatment of prisoners of war as pursued at the prison camp at Wittenburg and elsewhere. Considering these facts, I feel that we are bound in respect to ourselves and our Allies to strike these names from our list of Honorary Fellows of the College forever, thus showing, as much as possible, our disapproval of the attitude of the majority of the profession in the countries of the Central Powers. This feeling of abhorrence and disgust is so positive that I feel it would be weak and remiss if we passed it over and failed to take action showing our universal disapproval.

I want to thank every Fellow of the College for the confidence and honor you have placed in me in permitting my name to appear before you for three successive years. In concluding, I trust that

you will pardon my shortcomings at a time when our minds were filled with so many thoughts incident to life in France and a war in which nearly all of our available Fellows were actively engaged, and in which they have done such heroic work, bringing great credit to themselves and to the grand and magnificent institution which they represent and which stands out unique and distinct in the medical history of our beloved country.

RECONSTRUCTION PROGRAM OF THE UNITED STATES PUBLIC HEALTH SERVICE[1]

By CHARLES E. BANKS, M.D.
UNITED STATES PUBLIC HEALTH SERVICE

Whoever writes the history of the present war will find among the most significant of its developments the achievements of our profession in the field of preventive medicine. In one particular field alone he will be able to say that in the huge army of nearly 5,000,000 mobilized in the United States, there have been less than 200 cases of typhoid fever. The old familiar infectious diseases which passed under the name of camp fever, and army fever, in the history of past wars, will have no place in this record, and one can safely say that as a result of this remarkable work in sanitation and preventive medicine carried on by the allied military medical organizations, hundreds of thousands of fighting men were preserved from ignominious deaths from preventable diseases, thus saving them for the nobler purpose of winning the war at the fighting front.

What has been accomplished in the military zone under most unfavorable environments can be duplicated in our civil life under the less complicated environments of peaceful civilized life. The men whose lives were saved by the application of modern sanitary methods and the principles of preventive medicine are being demobilized and restored to the communities whence they were drawn. They come back educated in the basic principles of personal and collective hygiene, and understand by precept and

[1] Read January 1, 1919.

example the reasons and the necessity for the application of sound sanitary principles to the ordinary daily walks of life. These men know from experience the value of training in clean living, and they will not only follow these better things themselves, but demand that those who are in authority over health matters shall apply them to others as a means of self-preservation as well as conservation of the public health. The half-time health officer and the "any-old-time" health officer will find intelligent critics of his work among those returned soldiers, and the superficial work which has characterized a good deal of our health activities in the past will be no longer tolerated. The profession which is the custodian of the health spirit of the body politic must gird on its armor and be prepared for a reconstruction of means and methods in dealing with the public health.

It is trite to say that the world will not be the same after as before this pan-cataclysm, and what is true in relation to society at large will be true in relation to its component factors. There will be not only reconstruction of society, its industries, its morals and manners, but the ancient order of medical practice which consisted in attempting to cure diseases after they had become established will be superseded by the saner logic of preventive medicine forestalling disease by measures looking to rendering the individual and communities immune to preventable infections.

The leadership in this period of reconstruction will naturally devolve upon the national organization which is charged with the control of such matters, the United States Public Health Service. It has a program intended to meet the emergencies of this situation, for it is an emergency which has dislocated millions from their former habits of life and placed them under strenuous activities for an indefinite period, and then returned them to their former status but changed in spirit and purpose.

The program developed by the United States Public Health Service is comprehensive and far-reaching, and it depends on the spirit of coöperation by societies such as this that it may attain the degree of success which its sponsors have reason to anticipate.

The enumeration of them will sound like a homeric catalogue

of ships, but it may be said in advance that the order of sequence is not to be taken as indicating precedence in respect to importance, as each item is an important part of a general whole.

The limitation of time available for the presentation of this subject prevents any attempt at oratorical exploitation or felicity in phrasing, but, as the subject is an eminently practical one, it does not readily lend itself to rhetorical expression.

This program meets urgent national needs by outlining health activities which are practicable and which will yield the maximum result in protecting national health and diminish the annual toll of thousands of lives taken by preventable diseases and insanitary conditions. The success of this program will depend upon the active coöperation of Federal, State and local health authorities. Experience has shown that this coöperation can best be secured on the Federal aid extension principle.

1. Industrial Hygiene.

(*a*) Continuing and extending health surveys in industry with a view to determining precisely the nature of the health hazards and the measures needed to correct them.

(*b*) Securing adequate reports of the prevalence of disease among employees and the sanitary conditions in industrial establishments and communities.

(*c*) National development of adequate systems of medical and surgical supervision of employees in places of employment.

(*d*) Establishment by the Public Health Service in coöperation with the Department of Labor of minimum standards of industrial hygiene and the prevention of occupational diseases.

(*e*) Improvement of the sanitation of industrial communities by officers of the Public Health Service, coöperation with State and local health authorities, and other agencies.

(*f*) Medical and sanitary supervision by the Public Health Service of civil industrial establishments owned or operated by the Federal Government.

2. Rural Hygiene.

(*a*) Federal aid extension for establishment and maintenance of adequate county health organizations in counties in which the

county and State governments, separately or together, will bear at least one-half (usually two-thirds) of the expense for reasonably intensive rural health work; county health officer to be given status in national health organization by appointment as field agent of the Public Health Service at nominal salary, sanitary inspectors and health nurses also to be given official status in the Public Health Service.

(*b*) Detail of specially trained officers of the Public Health Service to formulate and carry out, in coöperation with local authorities, intensive campaigns for the sanitation of groups of rural towns, the work to be directed especially toward securing safe water supplies, cleanly disposal of human excreta, pasteurization of milk supplies, and bedside control of cases of communicable disease.

(*c*) Studies by a special board of officers to determine improved methods of rural sanitation, the studies to be confined to the most practical and essential phases of the subject.

(*d*) Widespread dissemination of the simple rules for rural sanitation through various governmental and civic agencies, such as the bureaus and divisions of the Department of Agriculture, the Farm Loan Board, agricultural colleges, public school boards, farmers' associations and women's clubs.

3. Prevention of the Diseases of Infancy and Childhood.

(*a*) Through coöperation with the Children's Bureau, Census Bureau, American Red Cross and other recognized agencies in promoting measures for child and maternal welfare.

(*b*) Through Prenatal Care by Promoting:

1. The adoption of measures for the adequate care and instruction of expectant mothers through visiting nurses, prenatal clinics, lying-in facilities, attention during confinement, and regulation of the practice of midwifery under medical supervision.

2. Safeguarding of expectant mothers engaged in industries.

(*c*) Through Infant Welfare Work, by Promoting:

1. The accurate registration of all births, and measures for adequate care of babies in homes, welfare stations, and day nurseries.

2. Instruction of mothers by visiting nurses. The enforcement of prophylactic measures to prevent blindness in the newborn.

3. Safeguarding of milk supplies and establishment of pasteurization plants.

(*d*) Through Supervision of Children of Preschool age, by Promoting:

1. The organization of divisions of child hygiene in State and local health departments.

2. Instruction by visiting nurses in general, personal, and home hygiene, and inspection for physical defects and the control of communicable diseases.

3. The establishment of clinics for sick children.

(*e*) Through Supervision of Children Attending School by Promoting:

1. The supervision of the home and school environment, including sanitation of school grounds and school buildings.

2. The maintenance of health supervision of school children by school nurses and school physicians to detect and correct physical and mental defects and to control communicable diseases.

3. Mental examinations of school children to determine and prescribe suitable treatment and training for children who fail in class work.

4. Water Supplies (National Development of Safe Water Supplies):

(*a*) By extending surveys already made by the Public Health Service of water supplies, checked by laboratory analyses when necessary, to be done by national, State, local, or university personnel and laboratories.

(*b*) Introduction and extension of methods of water purification according to results of surveys and analyses.

(*c*) Stimulation of communities to obtain safe water through national, State and local representatives and volunteer organizations.

5. Milk Supplies (National Development of Safe Milk Supplies through):

(*a*) Universal pasteurization (including adequate municipal supervision).

(*b*) Adequate inspection of production and distribution of milk and milk products.

(*c*) Stimulation of communities to obtain safe milk, through national, State and local representatives, and volunteer organizations.

6. Sewage Disposal (Proper Sewage Disposal will Control Intestinal Diseases, such as Typhoid Fever, Dysentery, Diarrhea and Hookworm. These Diseases now cause over 60,000 Deaths Annually. National Development of Safe Methods Through):

(*a*) Extension of water carriage sewerage systems wherever practicable.

(*b*) Elimination within municipal limits of cesspools and privies.

(*c*) In rural communities the installation of sanitary privies.

(*d*) The establishment of minimum standards of permissible pollution of streams, lakes, and rivers used for water supplies.

(*e*) Stimulation of communities to obtain safe sewerage disposal, through national, State and local representatives, and volunteer organizations.

7. Malaria. (National Development of Measures for the Control of Malaria and Malaria-bearing Mosquitoes in Industrially, Agriculturally, and Economically Important Areas of the United States):

(*a*) By the further dissemination of the knowledge of methods for its control (elimination of malaria mosquito breeding places through drainage, oiling, ditching, and the like) now being demonstrated by the Public Health Service.

(*b*) By the extension throughout the country of surveys of certain areas as to the prevalence of malaria and malaria-bearing mosquitoes.

(*c*) By increasing the corps of experts of the Public Health Service engaged in malaria prevention, and by the utilization of other national agencies wherever practicable to advise the communities as to methods for best handling their problems in malaria.

(*d*) Additional appropriations for the reclamation of large areas from malaria through proper drainage. Funds for such projects

should be supplied on a 50–50 basis by Federal and State governments. This plan is especially applicable to the control of malaria in communities where malaria conditions interfere with their economic development.

8. Venereal Diseases.

(*a*) Medical measures:

1. Establishment of clinics, dispensaries, and hospitals.
2. Epidemiological studies.
3. Free diagnosis.
4. Examination for release as non-infective.
5. Free distribution of arsphenamine.
6. Control of carriers through detention and commitment.

(*b*) Educational Measures:

1. Proper reporting of cases.
2. Standardization of pamphlets, exhibits, placards, and lectures.
3. Coöperation and national, State, local authorities and volunteer associations.
4. Coöperative work in industrial plants, shipyards and railway employees' organizations.
5. Coöperation with druggists' organizations to secure their voluntary aid in the control of patent nostrums for the treatment of venereal diseases.

9. Tuberculosis.

(*a*) Stringent provisions for the proper reporting of cases of tuberculosis.

(*b*) Adequate instruction of families and patients, especially in families where there is an advanced case.

(*c*) Hospitalization of cases wherever practicable, either through city institutions or by arrangements with State or district tuberculosis hospitals.

(*d*) Coöperation with national societies and agencies having for their object the prevention of tuberculosis or the improvement of economic conditions.

(*e*) Improvement of industrial conditions predisposing to tuberculosis, such as "dusty occupations."

10. Railway Sanitation.

(*a*) Consolidation under supervision of the Public Health Service of railway sanitation.

(*b*) Protection of railway employees by adequate health measures (*e. g.*, protection against smallpox and typhoid fever by vaccination and inoculation; supervision of food, water, and milk supplies consumed by employees; elimination of health hazards in shops and other work places; supervision of sanitary housing facilities; sanitation of railway communities).

(*c*) Protection of the Public by:

1. Sanitary supervision of water, milk, and food supplies furnished by railway administration.

2. Sanitary supervision of employees engaged in handling water and food supplies so furnished.

3. Sanitation of stations, terminals, rights-of-way, with special reference to sewerage disposal, malaria-mosquito eradication, and screening against insects bearing disease.

4. Prevention of the spread of communicable diseases through common carriers.

5. Improvement and regulation of ventilation of passenger coaches and railway tunnels.

11. Municipal Sanitation.

(*a*) Development and demonstration of the principle of employing full-time health officers by all municipalities.

(*b*) Enactment and enforcement of ordinances for adequate disease reporting.

(*c*) Provision for safe water, food, and milk supplies, and sewage disposal.

(*d*) Enactment and enforcement of special regulations for the improvement of conditions causing tuberculosis.

(*e*) Establishment of community health centers.

(*f*) Municipal campaign for the control of venereal diseases through venereal disease reporting; clinics for the treatment and control of carriers, and free treatment for all cases.

(*g*) Control of malaria and malaria-bearing mosquitoes in malarious regions.

(*h*) Enactment of proper building ordinances and provision for sanitary supervision of housing, especially in industrial centers, including improvements in transporation, so as to permit redistribution of persons living in overcrowded communities.

(*i*) Adequate systems of medical supervision of schools.

(*j*) Reduction of infant mortality by proper organization for prenatal care, bed space in maternity hospitals, and infant welfare stations, visiting nurses, and milk and ice stations.

(*k*) Stimulation of municipalities to realize their own responsibilities for health and the part played by adequate protection in the happiness and material prosperity of the community.

12. Health Standards.

(*a*) Communicable diseases. Promulgation by the Public Health Service of minimum standards for the control of communicable diseases.

Note.—The Service has published on this subject a report of committee of the American Public Health Association, upon which the Service was represented. This report should be reviewed and amended by a board of Service officers. It should then be formally approved by the conference of State and Territorial health officers, with the Public Health Service, and be promulgated by the Public Health Service as Federal standards.

(*b*) Industrial Hygiene. Standards of industrial hygiene and sanitation of places of employment should be prepared by the Service in coöperation with the Department of Labor.

(*c*) Sewage and excreta disposal. Minimum standards should be promulgated on the following:

1. Water-carriage sewerage systems.
2. Sanitary privies.

(*d*) Standard specifications for safe water and water purification.

(*e*) Community sanitation. Preparation of standard methods for scoring the sanitary condition of communities.

(*f*) Preparation of additional standards for the manufacture and the purity and potency of biological products and arsphenamine.

(*g*) Preparation of standards for illuminating, heating, and ventilating public buildings and schools.

13. Health Education. (To Increase the Knowledge of the General Public on Means Relating to Disease Prevention and Personal Hygiene.

(*a*) By the employment of medical sanitarians having special experience in educational methods and their use, in coöperation with Red Cross, National and State organizations, State and municipal health departments, State industrial commissions, and State and national health associations.

Note.—The prevention of the following conditions and diseases will be the special objects of health education: Excessive infant mortality, occupational diseases (see section on industrial hygiene), malaria, typhoid fever, hookworm, venereal diseases, pellagra, tuberculosis, pneumonia, cerebrospinal meningitis, and personal hygiene.

(*b*) By advocating and assisting in the securing of full-time State, district, and local health officers.

(*c*) By stimulation of States and municipalities to the acceptance of their full responsibility for public health conditions and the support of health activities by adequate appropriations.

(*d*) By the detail of Service officers to State health organizations and, when necessary, to city organizations, particularly in communities presenting special health problems.

14. Collection of Morbidity Reports. (Extension of Disease Reporting to be Accomplished Through the Collection of Adequate Reports of Disease Prevalence.)

(*a*) By the extension of the present system of collaborating epidemiologists.

(*b*) For the industrial group of the population, through the appointment of industrial surgeons and record clerks in various industrial establishments, such industrial surgeons to be appointed by the Public Health Service, at a nominal salary, so as to place them under the direction and control of the Service, and the remainder of the salary to be paid by the industrial establishments to which they are attached. In addition to reporting disease, these surgeons will act as medical and surgical officers and sanitarians. They will also report on community sanitation.

15. Organization and Training for Duty in Emergency of the Reserve of the Public Health Service.

(*a*) By the establishment of training schools in public health work in connection with stations of the Public Health Service and leading universities at which members of the Reserve may receive intensive training for short periods at stated intervals.

(*b*) Ordering members of the Reserve to active duty to participate in important field work of the Public Health Service.

The immediate future will be the most important period ever faced by the health authorities of this country. It will require not only all our energies, but the closest coöperation and sympathy of those naturally looked to as its friend—the members of the medical profession. If we fail to utilize this opportunity to its fullest extent to raise the standard of health administration throughout the land, it will be equivalent to an adoption of the spirit of reaction, if not a definite step backward.

If this great World War found us unprepared, let it not be said that the period of reconstruction also found us unprepared.

DISCUSSION

Dr. James M. Anders: The paper of Col. Banks is one of timely interest and great importance. The subject presents many points for discussion, and it would be impossible to take these up *seriatim* in the five minutes allowed for discussion. Public health activities have greatly suffered during the war, and this is perhaps especially true of civilian tuberculosis activities for the reason that many able workers were in the army and navy. It is therefore timely and important that a comprehensive program such as has been outlined here tonight should be put into effect. Fortunately a returning tide has set in from overseas, and from our own cantonments and camps and the time is at hand to plan public health work for the immediate future.

We have learned some important lessons during the recent world conflict, and perhaps the most important of these is the fact that individual efficiency of the men on the firing line is the foremost factor in modern warfare. With equal emphasis the war taught us that the most valuable asset that any nation can possess is a robust citizenry. The large per-

centage of rejections by the local draft boards of the men called to the colors directs special attention to the problem of physical education in this country during this reconstruction period; in short, an effort should be made to reach every individual in this respect. Every indvidual, it seems to me, should be taught how to promote his or her health, and I believe this could be best accomplished in connection with our public and secondary schools as well as in the colleges and universities.

We hear much about universal military training, and the idea is to be encouraged, but to my mind universal military training would not be going far enough. The scope of the plan should be, and the one to us tonight is, sufficiently comprehensive to include the entire American race. I believe that if in the immediate future sufficient attention were devoted to the matter of physical education a great many of the detals to which reference has been made in the program outlined by Col. Banks would be found in due course to be unnecessary.

You are all probably aware of the fact that in England there has recently been formed a ministry of health which will combine and coördinate all the public health activities under one head. It seems to me that such a reorganization of the public health activities in this country would be a consummation devoutly to be wished. It would certainly facilitate what Col. Banks has emphasized, namely, the necessity of sympathetic co-operation among all allied agencies that have to do with public heatlh work. I feel strongly that the present would be a propitious time; indeed, there could be no more propitious time to organize and set in motion efforts in this direction.

CONCERNING CONCUSSION AND CONTUSION INJURIES OF THE EYE IN WARFARE[1]

By G. E. de SCHWEINITZ, M.D.
LT. COLONEL, M.C., U. S. ARMY

It is plainly evident that in the insistent work, nervous energy and scientific curiosity of life, man tries to be "ever reaping something new." Therefore, it is that the question is constantly asked by laymen as well as by physicians, "What are the new discoveries, new methods of procedure and new therapeutic measures which the science and art of medicine and surgery have acquired and put into practice during this war, now happily in abeyance?"

They, the investigations of the laboratory and the work of preventive medicine, contribute a long catalogue in which ophthalmology has obtained a not inconspicuous place. We could, with profit, discuss with one another the improvements and advances which have been made in blepharoplasty and conjunctivoplasty, in prosthesis, in dermic and epidermic and cartilage implantations and props, in the extraction of metallic and non-metallic intraocular foreign bodies, in the prevention of sympathetic ophthalmia and of ocular sepsis and in the improvement of first-aid technic.

Interesting as such a discussion might prove to be, with your permission this communication concerns itself only with some of the results of ocular concussion—and contusion—injuries in warfare, and makes mention of some of the pathogenetic problems which they present, of certain of the differences which are evident as compared with the results of such injuries in civilian life and of one or two new clinical pictures.

[1] Read February 5, 1919.

The experience on which the observations are based was obtained in three "eye centers" of the British Medical Service in France and two general hospitals to which wounded were evacuated in England, one French "eye center," and in all of the "eye centers," except one, which have been established in this country since the wounded have arrived in large numbers. In the last-named "centers" naturally none of the lesions were of recent date, most of them having occurred weeks and many of them several months prior to their examination.

Already a large literature has accumulated on this subject and is scattered through various journals published in France, England, Italy and Germany, and at least two important atlases have been produced, namely, *Atlas d'Ophtalmoscopie de Guerre,* by Lagrange, and *Atlas der Kriegesaugenheilkunde,* by V. Szily. Colonel W. T. Lister, of the English R. M. C., has made notable contributions, for example, *Pathological Aspects of War Injuries of the Eye.*[1] No attempt is made to analyze the scattered literature, but to the text of the two atlases named and to the recorded observations of Colonel Lister constant reference shall be made.

Causes. In general terms the fundus lesions now under discussion are caused *directly* by a blow, or sudden forceful pressure, on the eyeball, behind, from the side or tangentially; or *indirectly* by the transmission of concussion or shock (contrecoup).

In the first instance the lesions are classified as *lesions by contact;* in the second instance they are *lesions by concussion.*

The contact lesions are caused, for example, by a missile which grazes the globe but does not rupture it, or by a fragment or portion of a fractured orbital wall or floor or roof, thrust harshly against the eyeball.

The concussion lesions are caused: (*a*) By concussion at a distance, for instance, violent displacement of air by the explosion of a shell (Lagrange); (*b*) by transmission of concussion or shock through the bony facial structures, and, moreover, not only through those near to the eye, to wit, the malar bones and orbital

[1] Lancet, 1918, ii, 67.

margins, but through the superior maxilla (especially if the missile passes through the antrum), and the inferior maxilla, some authors, notably Langrange, believing that the vibratory concussion proceeds to the orbital contents through the pterygomaxillary fossa and fissure; and (*c*) by slight blows on the anterior part of the eye, the concussion being transmitted through the transparent media to the posterior pole. (Lagrange.)

The lesions as usually described may be summarized thus: (1) Lesions by concussion, (2) lesions by impact and (3) combined lesions, *i. e.*, both by concussion and impact, with the lesions in front of or adjacent to the spot of contact, and also immediately opposite to the site of impact; or, in another sense, as lesions which are not associated with and lesions which are associated with fracture or perforation of the orbit (passage of a missile through it). This rule in the distribution of lesions makes ophthalmoscopic examination of great value in determining the course of the missile.

In the first case, as before noted, the concussion is transmitted from a distance (par ébranlement de l'air) or through the bony facial structures, or through the cornea and transparent media, the orbital walls, floor, roof or cavity not being directly injured.

In the second instance there is traumatism of the frontal region and radiating fracture of the orbital vault or passage of a missile through the orbit behind with injury of the optic nerve, but not of the bulb, or passage of a missile through the orbit tangentially to the eye, grazing it but not rupturing the globe Should the lesions of the inner membranes result from a concussion at a distance, their development has been attributed to the commotion of the air-column shaking the ocular wall in the same manner as it shakes the door in a room. Should the concussion waves reach the eye in a line of transmission through the bony facial structure, the effect has been likened to the lifting up and shaking of a ship by a ground swell, and the entire adipose envelope is concussioned, resulting in ruptures of the inner ocular coats (Legrange). In this connection it may be interesting to quote from an editorial review of Bonnet's recent contribution to the study of the effect of shell explosions on the human organism, published in the

Journal of the American Medical Association, February 8, 1919. Bonnet explains the nervous and pulmonary lesions which follow shell explosions by assuming "that the aerial wave-compression acts primarily on the superficial capillaries and bloodvessels, as well as those of the abdominal cavity; in short, those not protected by nature from pressure. There is thus formed a blood column which is driven like a battering ram into incompressible cavities, like the thorax and the cerebro-spinal cavity. As a result the smaller vessels in these cavities may rupture, causing varying amounts of injury. The eye and the ear are especially liable to suffer, the former by its position exposed to pressure, and the latter by its physiologic adaptability to receiving pressure."

Symptomatology. Of external manifestations there may be none at all, or often at most edema of the lid, some diffuse redness, or a patch of congestion or ecchymosis. In other words, absence of outward signs is not necessarily an indication of lack of intraocular lesions, and moreover, of extensive ones. Therefore routine ophthalmoscopic examination of the eyes of wounded soldiers, whenever possible, has revealed many times elaborate retinochoroidal and vitreous changes. Thus, I examined an English soldier within forty-eight hours after he was hit. He had severe arm and leg wounds and probably tangential orbital injuries. Externally his eyes were practically clear, and yet in both of them there was much vitreous hemorrhage and extensive concussion changes in each fundus.

Naturally, the character and degree of the visual depreciation depend upon the extent, situation and age of the lesions. An interesting and evidently an important fact, dwelt upon by Colonel Lister, is that in severe concussion resulting in commotio retinæ, presently to be referred to, vision may be completely lost for several days, followed by a return, but as a matter of course in the serious types there is often permanent reduction of visual acuteness.

The visual field changes evidently depend upon the location of the lesion and its depth and character. But to the correlation of lesions of the retina, with defects in the field of vision, much study

has been given, especially by Colonel Lister. As a matter of interest his observations may be quoted in summary thus: "Lesions above or below the horizontal plane were found to cause defect in the field out of all proportion to the local disturbance, a 'distribution defect' being found in addition to the local defect due to the lesions. This is due to the fact that not only was the spot struck damaged, but also nerve fibers in the immediate vicinity which were passing on to a more peripheral portion of the retina. This distribution defect is fan-shaped, the expanded portion being peripheral and the nearer the lesion is to the disk, the greater is the blind sector, and *vice versa*. When the lesion occurs in the horizontal plane there is no 'distribution defect' found, as the fibers supplying the retina in the horizontal line arch round from the disk to their destination, and therefore these lesions can only involve the nerve fibers at their terminations."[1] Scotomas of various shapes may interpret the macular and paramacular alterations.

Marked reduction of intraocular tension is common in many of these cases. The statement that lowered eyeball tension is an important sign of perforating scleral wounds, and especially of diagnostic import when, for example, a small penetrating wound of the sclera is covered with tumid, and it may be swollen, conjunctiva, must not be taken unreservedly in view of the many observations in this war. Indeed, as the late Mr. Nettleship said in the discussion of a case of prolonged hypotony after contusion recorded by E. Treacher Collins,[2] the practical interest in the report consisted in the demonstration that reduced tension of the eye does not necessarily mean wound or rupture of the globe.

Collins suggests that diminished tension of short duration is due to increased rate of excretion of intraocular fluid through expanded normal channels of exit, or to arrest of secretion from paresis of intraocular nerves; and that diminished tension of long duration is due to the formation of new channels of exit, or to

[1] Review of War Surgery, prepared in office of Surgeon-General, December, 1918, No. 10, vol. i.

[2] Transactions of the Ophthalmological Society of the United Kingdom, 1916, xxxvi, 204.

rupture of the pectinate pigment, or detachment of the pars ciliaris retinæ. Magitot ascribed the variations in ocular tension to the action of the trauma upon the intraocular vasomotor nervous system.

The ophthalmoscopic pictures of the variously transmitted *concussion* and *impact* effects necessarily vary according to the stage of the process at which they are examined, but in general terms may be divided into *primary* and *secondary* changes.

The commotio retinæ of Berlin, so often noted in civilian practice, after blows on the eye, for example, the impact of a tennis ball or a flying cork, may be summarized as follows: Hyperemia of the globe marking the position of contact of the missile; clear media; and gray opalescence of the retina, especially in the macular region, but also around the papilla, which may be somewhat hyperemic. If the retina under the point of contact is visible, this also may exhibit the white infiltration. In addition, several pale, yellowish spots and, occasionally, small hemorrhages may be present. The vessels are unchanged, or, in some instances, are contracted (arteries) or distended (veins) and pass *over* the gray area. A central scotoma may exist. The gray infiltration forms quickly and is also absorbed with rapidity, usually having subsided at the end of two or three days, although the visual defect may last for longer periods.

The commotio retinæ produced by such war injuries as have been referred to differ somewhat from the Berlin type in the presence of more numerous hemorrhages, the markedly yellow tint of the so-called retinal haze, its longer duration and more circumscribed character.

An interesting but evanescent picture has been observed and particularly described by Colonel Lister in the later stages of commotio retinæ after disappearance of the haze, namely, peculiar striæ in the vicinity of the macula, almost certainly due to the wrinkling of the swollen retinal layers.

Lister calls attention to the *grossly concussioned fundus*, where in the early stages there are wide-spread clouds of hemorrhage, many gleaming and glistening white particles, which gradually

fade, become converted into fibrous tissue, and represent originally patches of coagulation necrosis from rupture of retinal and choroidal vessels. Lacerations of the choroid and retina, or of their vessels, or of both, followed by hemorrhage beneath the retina and into the vitreous, are common. They depend in part upon stretching of these membranes by the vibrations in the vitreous. They are frequently placed at the posterior pole of the eye and near the papilla. These situations are peculiarly liable to be selected, according to some observers, probably because the sclera, thicker around the entrance of the optic nerve than elsewhere, does not readily stretch. Its resistance in this regard causes the effect of the force to be more potent on the tissue just in front of it. Accumulation of transuded serum and of hemorrhage between the choroid and retina and between the choroid and sclera may cause detachment of the retina and of the choroid.

The lesions just recited are *primary*, whether due to concussion, contusion or impact. They naturally lead to the *secondary* lesions, the most important being atrophic chorioretinitis (spots of atrophy, exposed scleral areas and pigment distribution, heaping and fringing) and proliferating chorioretinitis. If the extravasations on the retina and choroid are absorbed, many of the well-known appearances of pigmented atrophic chorioretinitis are evolved, though frequently its elaboration is most extensive, especially in fan-shaped, pigmented granular areas. Blood may escape, and often does, into the vitreous and be absorbed, leaving all manner of opacities in its place.

The chorioretinitis proliferans is essentially a cicatricial process; there is organization of hemorrhage, but this is of less importance than its irritating effect on the connective tissue of the retinochoroidal layers, inciting to active proliferation and the formation of tracts, areas and masses of fibrous tissue. The whole process and picture differ materially from the so-called proliferating retinitis of recurring hemorrhages in the vitreous and retina, especially in young subjects, often noted in civilian practice. In the type which follows war injuries, the retina and choroid have been ruptured, and the cicatrical process leads rather to a pinning down

of the retina by opaque, plastic-looking material than to its detachment, so frequent in the ordinary variety, in which the proliferation arises from extravasated blood, and the numerous membranes, following the vessels, often partly translucent, protrude freely into the vitreous. As you know, Lagrange has constructed in tabular form the chief differential diagnostic points, as briefly indicated.

In the concussion-contusion injuries of the eye in civil life the so-called "holes" at the macula are comparatively common, while, according to Colonel Lister, in military practice these holes are comparatively rare. This, however, has not been my own experience. Within the last six weeks, among about twenty-five cases of the types we are considering, I have seen four typical holes in the macula, the surrounding areas splotched with pigmented retinochoroidal changes.

Some authors, for instance Lagrange, have occasionally noted defective vision, central scotoma and no evidence of ophthalmoscopic change in the macula. This I have not observed, but I have seen a fundus free from pathological signs, except a delicate stippling of the macula and a minute Y-shaped choroidal rupture; one case recently studied with Major Suker followed a blow delivered on the orbital ridge of the affected eye. It required careful focussing to detect it.

On the other hand, in place of the usual impact and concussion lesions, there may be extensive disorganization of the interior of the eye (without rupture): Liquefaction and infiltration of the vitreous, widespread masses of yellowish-white exudation and large detachment of the retina. In a remarkable case recently investigated the soldier had been wounded in the head, the missile probably passing through both orbits, and the *x*-ray showed a large fragment located near the Gasserian ganglion. In the right eye the vitreous was thickly infiltrated, the fundus difficult to see, but covered with yellowish exudation, and the retina detached below. In the right eye over the disk and partly hiding it there was a mass of fibrous material; otherwise no changes and vision 20/xxx. While under observation this left disk within

two weeks developed a typical choking of 7 D., depending on late formation of abscess in the track of the missile.

Notable are the cases of injury of the optic nerve in the canal by a missile passing through the orbit posteriorly, which sometimes cuts across the nerve, or the nerve is injured by a radiating fracture of the orbit. Mostly the result is an irremediable atrophy of the nerve and blindness. Hematoma of the sheath of the optic nerve has often been found, resulting in atrophy. Peripapillary hemorrhage in these cases is rare; but a peripapillary brown ring, due to hemic pigment, is a diagnostic symptom in the latter stages. Atrophy of the nerve is the usual result.

Avulsion of the optic nerve, which is jerked from its socket, is not infrequent. After the hemorrhage absorbs, a traumatic excavation is visible—a kind of "coloboma or surgical conus," as Lagrange calls it. This may be filled up later with proliferated connective tissue. The retinal vessels above and below the excavation may be comparatively normal. This has been often noted, and recently well figured and commented upon by Edward Jackson.[1] In the report of Parsons's case of division of the optic nerve by a stab-wound, quoted by Jackson, Parsons states the vessels refill through direct and indirect cilio-retinal anastomosis, the blood being derived from intact anterior and posterior ciliary arteries. In a case studied within the last two weeks, the missile, *i. e* , a fragment of a high-explosive shell, entered at the lower and outer angle of the left orbit, shattered the eye, passed behind the root of the nose and probably through the frontal sinus and certainly through the posterior part of the orbit and came out beneath the skin of the right temple. The right eye had extensive retino-choroidal changes and the optic nerve had evidently been partly or completely jerked from its entrance. This entrance was covered in with a proliferated fibrous mass, but the vessels were fairly well intact.

Frequency and Distinctiveness of the Lesions. In general terms, contusion and concussion injuries of the eye in this

[1] American Journal of Ophthalmology, November, 1918, p. 776.

war have been frequent, and those which have followed oblique wounds of the facial bony structures have represented about 6 to 8 per cent. of the whole number. Thus Rollet and Velter, among 3915 wounded, noted 343 examples of lesions of the deep coats of the eye without disorganization of the eyeball, a percentage of 8.76.[1] It is of interest to note that a concussion sent through the maxillo-facial area of one side and causing ipsolateral ocular lesions is probably prevented from producing similar lesions in the opposite eye because the nasal accessory sinuses prevent the concussion or shock from passing to that globe. There seems very little doubt that lesions of the inner eye by concussion from a distance, by concussion transmitted through the bony facial structures and following blows on the point of the eye, by preference are located in the macula and paramacular area; that impact lesions are equatorial and always adjacent to the site of contact; that a contact lesion may spread toward the center; that posterior pole and equatorial contact lesions may approach and join each other; and that missiles traversing posterior to the bulbus and radiating fractures of the orbital vault are responsible for most of the direct optic nerve injuries. Whether it is safe to say that impact lesions are always, or almost always, retinochoroidal and concussion lesions choroidal, as Lagrange contends, it would seem is not definitely settled.

Unquestionably the difference between concussion changes of the fundus encountered in civil and military practice depends, as Lister points out, in greatest measure upon the fact that in ordinary circumstances the blow is delivered by a comparatively slow-moving object, while in warfare the missile passing through the orbit moves rapidly.

As special types of concussion and contusion injuries as observed in warfare in comparison with those seen in civil practice, we may note the character of the commotio retinæ, the elaboration of the severely concussioned lesions and in particular the distinctive character of the traumatic proliferating chorio-retinitis. Finally,

[1] American Journal of Ophthalmology, November, 1918, p. 211.

it should be noted that all observers comment on the analogy between the mechanism of these concussion injuries of the eye and those of the brain.

Treatment In the hope of stimulating extravasated blood and exudation, the usual alterative, diaphoretic and lymphogogue remedies (the iodides, sweats and dionin) may be tried, as may electricity, especially for those eyes with much vitreous change. Thyroid extract is also employed. I am frankly skeptical whether remedial agents have much influence, and more than skeptical as to the value of subconjunctival injections. In a certain number of apparently severely concussioned eyes after long periods of time there has occurred notable improvement in vision [1] Transitory astigmatism after direct concussion has often been noted.

DISCUSSION

Captain George H. Cross: It was my very good fortune to see a large number of these most interesting cases of which Colonel de Schweinitz has so instructively and entertainingly spoken tonight. When I was assigned to the ophthalmological service at Cape May several types of these cases had been received there in large numbers, though we saw only the very late stages of injuries, two, three and five months having elapsed after the injuries were incurred. It might be of interest to state that we had one case in a soldier who was injured at quarter of nine on November 11, the day of the signing of the Armistice. The interesting picture presented to us was the great extent of the hemorrhages or involvement of the fundus, which seemed to mask everything, until a true conception of the condition was obtained. A long time after the injury there would be seen the appearance of a rupture, but it was difficult to tell whether there was atrophy or rupture of the structures beneath. We had one interesting group of cases of so-called "holes in the macula." So far we have had three of these rather rare cases at Cape May, one of which was received during Major Chance's service. All three were differ-

[1] The paper was illustrated and the various types of concussion and impact injuries portrayed by means of a series of diagrams taken from Lagrange's and v. Szily's Atlases, and some water colors by the late Miss Margaretta Washington of concussion injuries in civil practice. Drawings which are to be made of the fundus lesions studied in the various American eye centers were not at the time available.

ent in size and type, one being larger, one smaller and the third one almost an identical copy of the illustration in Colonel de Schweinitz's text-book. While in the service at Camp Meade last summer I saw two cases of "holes in the macula," both having occurred prior to enlistment in the service and in colored men. One of them gave the history of having been hit in the head with a base-ball bat. At Cape May all were due to injuries of the skull and not directly to the eye. Major Maxey, who was in charge of the eye service at Camp Sherman, visited us several weeks ago, and in discussing these cases stated that he had seen three cases in the service at Camp Sherman; all in colored subjects. At the present time we have a very interesting case of a different character, a soldier with a piece of shrapnel about 1 cm. square in the median line of the sphenoid, which penetrated straight in without injuring either eye directly, but the visual fields are most unusually contracted. Externally the eyes are perfectly normal and in no other way is there any evidence of this rare accident. We have had cases in which the missile struck the antrum and injured the orbital rim and floorf which necessitates waiting until the metal is removed before we can repair the wound by skin and cartilage grafting. Yet the eye-ball shows no external evidence of injury, while internally are found these rare fundus conditions. In some cases the M. G. bullet or shell fragments have torn away the orbital rim and parts of the bony wall, but have caused no injury to the eye-ball itself, except displacing it from its normal position. Examination of the visual acuity shows that there may be only light preception noted, with this peculiar condition of the fundus, while in other cases a surprisingly large percentage of vision is retained. In one case of massive proliferative retinitis three-fifths of the fundus is involved; this is the case of which Colonel de Schweinitz has spoken as being so like the one pictured in Lagrange's *Atlas*. In one soldier the foreign body did not injure the globe directly, but struck the rim of the orbit traveling along the nasal side, finally lodging in the orbital fat, the patient stating that when he was struck he became temporarily blind in both eyes; in three or four days he began to recover vision in the right eye, and when he had arrived at Cape May, the fundus picture was that of a fine, granular pigment in a triangular area below the disk, with no other evidence of injury; yet when his field of vision was taken there was a preceptible diminution of vision in an area corresponding to the pigmented area noted in the fundus, but no scotoma was found; other than this there was no pathological condition noted.

The service at U. S. A. General Hospital No. 11, Cape May, N. J., has been a most interesting and wonderful one from the standpoint of the ophthalmologist; at one time we had 175 eye cases, most of

them being due to traumatism; in fact there has been very little inflammatory work, probably the most unusual and extremely interesting group of cases, of which we have had a great number, are those requiring plastic repair for the loss of eyelids and portions of the bony orbit, the removal of disfiguring cicatrices and the operations on contracted sockets which were incapable of retaining a glass-eye prosthesis.

Major George Francis Suker: It is a great pleasure to me to hear what Colonel de Schweinitz has so well said. I have nothing to add, except a word or two regarding certain wounds and injuries received on the head, giving fundus lesions and corneal injuries. One young man had lost an area of about 6 cm. by 4 in the occipitoparietal region, leaving him vision of 20/40 in each eye. There was contraction of the field of vision in each eye to almost gunbarrel proportion. In another case of gunshot wound from shrapnel the injury was in the right mastoid region. This man also had lost an area of vision from the depressed scar, with a concentric contraction of the visual field in each eye, probably from edema. In both of these cases there were pinpoint hemorrhages in the retina. The cases show that the eye injuries in this war are many and varied, and the fundus pictures, as described by Colonel de Schweinitz, are most interesting indeed. One wonders at the good vision that is often left despite the extensive injuries received. Upon the first inspection of the wounds it would often seem that the man had no more vision than that of counting fingers, but later there has been shown to be 20/60 or 20/50 and a relatively large field. The first appearance of a picture is, therefore, not an index of the amount of reduction of vision that a man has suffered, fortunately for him. In the case mentioned by Colonel de Schweinitz, in which there was a Y-shaped tear in the choroid in the macular area, the diagnosis was made abroad and the injury, which was $1\frac{1}{2}$ mm. in extent, was not then found. The field of vision is a little better than 10/200 while the other eye is normal.

In addition to speaking of the work that is being done, it is a satisfaction to let you know that all these young men are as happy as they can possibly be, and all those with whom I have come in contact would just as soon have lost both eyes as one, were such loss called for. That is the attitude which all the American boys have taken. If they had not taken that attitude I daresay we would not be where we are today.

RE-EDUCATION OF THE BLIND SOLDIERS[1]

By LIEUT.-COL. JAMES BORDLEY

I HAVE come to tell you something of U. S. General Hospital No. 7, or, as it is popularly called, Evergreen.

Before describing the work there of physical and mental rehabilitation, let me say a word about the subject of blindness in general. In order to avoid mistakes in the selections of occupations to be used in the reëducation of our soldier-blind, an intensive investigation of the wage-earning pursuits in which the civilian-blind are engaged was undertaken. This survey revealed some very startling facts: That the vast majority of the 85,000 blind in this country are dependent either in part or in whole upon the charity of friends or State; that in one hundred cities 43 per cent. of the professional beggars are blind people; that the average wage of conscientious, willing, working blind men is about four dollars per week and for the same type of blind women about half that. It is not surprising, therefore, that a host of blind people do not show a very keen desire for employment, and this is a conspicuous fact. The employers of labor are just as loath to give the blind decent jobs.

It matters little whether the blind man or the employer is more responsible, the important fact is that blind people have a very definite economic value, and when properly trained and placed, can carry on to the satisfaction of both employer and employee. It only remains to discover such occupations and to devise schemes for training: not very difficult problems! More money is wasted

[1] Read February 5, 1919.

each year in foolish charity than would be required to train and place our whole blind population.

Few people know there is not a single school for the vocational training of the adult blind in the United States; that there has never been devised a scientific scheme for their education and training, and that not a single normal school trains teachers for the blind.

Indeed, gentlemen, the medical profession is not altogether blameless for the mental deterioration of many blind people. Through mistaken sympathy the blind are kept in ignorance of their real condition. They frequently have held out to them some hope for future sight. Well, just the most unhappy mortal in the world is the blind man who sits, day after day, waiting for the fulfilment of the physician's prophecy that he will see again. The family catching at any straw in their terror for the future continually remind the victim of that prophecy. When the truth dawns upon man and family, much valuable time has been lost and the blind has formed habits of idleness and dependence.

As an illustration, one of our soldier boys returned with both eyes enucleated, some kindly, sympathetic nurse told him that while his right eye had been badly injured, that he would some day be able to see out of his left. It took us over a month to convince this poor chap that it was humanly impossible to restore his vision. Indeed, he remained unconvinced until his mother pleaded with him to accept the truth. During that month this fellow persistently refused to be taught the ways of the blind and resented any suggestion that he even try to walk.

The attitude of the family is often a most serious drawback to the development—occupationally—of the blind. Their loving sympathy and distress make them slaves. They lead and feed and pet their afflicted relative until he frequently loses all initiative, pride and independence.

The attitude of the public is really responsible for much of the blind people's trouble. Let me illustrate this attitude: One of our returned soldiers was given a month's furlough; at first he declined to go, later he said if the time were reduced to four days he would go. When he returned he was invited to one of the

dinners periodically given by me to the patients at Evergreen. He there told his story. He had always had an aversion to the blind, and he knew his family had, therefore he was afraid to go home. His reception, however, was most cordial. While he was at home he went out by himself to a store in the neighborhood to get some ice-cream. As soon as he sat down the proprietress started in to question him, and when she found that he was a blind soldier she went to the back of the store and opening a door, called, "Oh, Pap! You and the children come down here; I've got something to show you." They came and forming a circle around him, silently watched him while he ate his cream. As he left Pap slipped into his hand a dollar bill. This, I think, is typical of the attitude of the public. The blind are sort of curiosities, to be gazed upon in silence and supported by charity.

It was primarily to overcome this attitude that St. Dunstan's, in England, and Evergreen, in this country, were opened. They stand for a new thought in the education of the blind. They are not schools in the narrow sense, but more properly universities, where blind men are taught hope and courage, trades and professions, ambition and success. The men there are not poor, dear, blind boys, but strong, resolute, normal men, willing to strive and expecting to win. I wish you could see their happy spirit in their daily work and listen to their jokes and songs. Never a word of regret at their sad plight do you hear from them.

The courses are divided into recreational, essential handwork and vocational.

The blind man has more difficulty learning to play than to work, so no effort is spared in bringing him to a sane view of the necessity for exercise. For this purpose there is music, dancing, bowling, swimming, gymnasium exercises, as indoor activities, and field events, as outdoor fun.

Included in the essential handwork course is typewriting. The typewriter in the every-day life of the blind takes the place of the pen or pencil, and this is very essential as the handwriting rapidly deteriorates. As a commercial asset it has, of course, great value. Another essential study is the raised dot type of the blind—

Braille. As a means of developing touch, it has distinct advantages, but as a means of developing concentration it is unexcelled. Of course, from a practical standpoint, it provides a way for keeping notes and accounts and helps to while away many hours which would otherwise be profitless and dreary.

The usual schemes for developing the sense of touch are taught —net-making, weaving, basket-making, chair-caning—these, however, are not taught with the idea of their being utilized as wage-earning occupations.

As occupations of profit there are taught bookbinding, telephone-operating, massage and various other industrial and commercial subjects. The commercial course embraces salesmanship, personal efficiency, public speaking, economics, commercial arithmetic, creative accounting, grammar and spelling, typewriting (and use of other office appliances), business English, commercial correspondence, business organization and practice, retail store management and technical subjects, such as certain commodities liable to be dealt in. This work is practically applied in an experimental store, which has a place in the plan of our business teaching. This experimental store is but the advance agent of a chain of stores which will be operated by and in the interest of our blinded military men. The experimental store in size, color, shape and fixtures is the model that has been adopted for all the stores. The blind men who prove themselves capable will be transferred from the experimental store on the Evergreen grounds to our experimental stores in the business section of Baltimore. In these stores will be sold tobacco products, "box candies," stationery, etc. A man once familiar with the stock and its location can be transferred, if need be, from one store to another without confusion. These stores are to be called "The Victory Stores"—Victory meaning the defeat of gloom, despair and affliction by the blind man himself.

It may be of interest to you to know how our plan for teaching industrial work was evolved. It was believed that many failures of the civilian blind were due to trying to put a "square peg in a round hole." We therefore employed an industrial engineer to

make a survey of industry. First, industries were classified, then typical plants in given trades were selected. Every job in these plants was analyzed, the basis for the analysis being the physical requirements for the jobs. It can be readily seen that by a process of elimination it was easy to determine what jobs the blind could fill. Of course, there are many factors besides the job itself which must be considered in the choice of work for the blind; these factors were concurrently studied. As soon as an operation is determined upon as advisable, the best-sighted man (or woman) in the plant engaged in that work is put in motion and a time-study motion picture is made. These moving pictures constitute the text-books of our teachers on that subject.

The blind are made familiar with various types of plants by models. They are taught their own economic value as working units, the economic value of the work upon which they are engaged. In short, we try by education and training to more than overcome the handicap of blindness.

RESEARCH WORK ON THE PROBLEMS OF AVIATION[1]

By WALTER B. LANCASTER, M.D.
BOSTON

Permit me to express my deep appreciation of the honor of speaking before this College and particularly when the other speakers on the program are men of such distinction.

You are familiar with the oft quoted statistics of the British Air Service, which showed that of the enormous wastage, which they suffered during the early part of the war, three out of five of the losses were due, not to the bullets of the Hun, not to defects of the airship, but to faults or defects of the flyer. And further that, when they adopted suitable measures to eliminate or rectify these defects by care of the flyer and by seeing to it that the flyer was "fit to fly," these losses were reduced to one out of eight instead of three out of five, about 12 per cent. instead of about 60 per cent.

You are familiar also with the results of the study of these defects and failures of flyers, begun long before the war, and carried on so much more intensively since. You know that it has been shown beyond a doubt that the chief factor in the loss of efficiency which overtakes the flyer is the lack of oxygen to which he is subjected at high altitudes—at all except the lowest altitudes. I need only mention the well understood and fundamental fact that as you go up in the air, whether on a mountain or in an airship, the air becomes thinner, and so there is less oxygen in each liter of air. Hence some compensatory mechanism is needed. The flyer must

[1] Read February 5, 1919.

breathe deeper, so as to get more air at each respiration, and he must breathe oftener; his blood, since it carries less oxygen, must move faster, so as to get the needed amount of oxygen to the tissues; his vasomotor control must see to it that the blood is so distributed that the most imperative needs are supplied at the expense of less urgent demands by other organs and tissues.

All these things show the need of a medical research laboratory connected with the air service division of the Surgeon-General's Office. Its functions have been threefold:

1. Classification of aviators.
2. Training of workers for the care of flyers, either as members of branch laboratories or as flight surgeons.
3. Research.

I can speak only of the last. It has occupied a very small part of our time as compared with the classification of flyers and the training of ophthalmologists for branch laboratories and of flight surgeons for the care of flyers. Not until a very few weeks before the armistice was the quota of workers completed.

The factors which cause disturbances of the visual functions in flight are:

Wind.
Cold.
Intense light.
Fatigue.
Lack of oxygen.

Wind can be provided for by goggles. The force of the wind is almost inconceivable. In tractor planes, when the propellor is in front, the windage of the propellor is added to the velocity of the ship's movement. Two hundred miles an hour is not an unusual wind movement. The force of the wind increases not as the velocity or even the square of the velocity, but as a still higher power. If you stretch out your hand from the protected fusillage, the resistance is so great that it feels as if your hand were in water or some other element than air. Hence, the necessity of much more carefully designed goggles than would suffice for motoring or the like. The laboratory was asked to design suitable goggles,

and this work was entrusted to Captain Goodwin, of the department of engineering at the laboratory. He has produced a satisfactory design, which has been submitted to the department of military æronautics.

Cold acts by condensing frost on the goggles and so interfering with vision. This is avoided by suitable ventilation of the goggles and by coating the glass with a non-fogging substance.

The intense light is satisfactorily provided for, in most instances, by the adaptation of the retina. Unless there is an eye-strain from some refractive error or a hyperemia from some cause, making the eye oversensitive to light, it is not necessary to use tinted lenses to protect the eye from the light. We have no data which show any impairment in vision from reduction in temperature before that reaches the stage when other functions are so far disturbed as to cause complete inefficiency.

We have, then, fatigue and lack of oxygen (which we will refer to as asphyxiation) as the chief factors in disturbing the visual functions.

It will help us to a clear comprehension of how flying affects the visual functions if we divide those functions into three classes. The first class comprises the percipient or sensory functions; the second the adjusting mechanisms; the third the psychic side of vision.

Under percipient or sensory functions we consider light sense, color sense and, to a limited extent, form sense and visual fields.

Under class two, the adjusting mechanisms, we place:

(*a*) The function of fixation, which corresponds to the pointing of a telescope or other optical instrument at the object we wish to see.

(*b*) Focussing.

(*c*) Adaptation to light.

The psychic side of vision includes stereoscopic perception of depth, the various judgments of speed, of distance, of perspective, etc., matters of judgment and discrimination based on visual perceptions.

1. Now investigations bearing on the sensory or percipient

functions show that they are maintained unimpaired under the stresses and strains of asphyxiation and fatigue. As long as the subject is able to make known what he sees, he shows no failure of light sense or of color sense; possibly some diminution in form sense may occur, probably due to impairment of the focussing, as will be mentioned later; and possibly some contraction of the visual fields may appear; if so, it may be due to defective circulation in the periphery of the retina rather than to any direct effect of the asphyxiation or fatigue.

This resistance power of the sensory functions to asphyxiation is also exemplified by the other senses, such as hearing. It is a very important fundamental fact bearing on the physiology of sensation.

2. When we consider the adjusting mechanisms we find a different state of affairs. These adjustments are necessarily somewhat complex. Consider fixation. The stimulus falls on a peripheral part of the retina; the eye must be automatically rotated so that it will fall on the fovea. For this the twelve muscles which move the eyes must be innervated so that both eyes move together with great swiftness and precision; and the eyes must be so held by these muscles that the image will continue to fall on the fovea even though the head and body and airship may be moving so as to shift the image. We need not be surprised, then, to find that if any defect is present in the mechanism of fixation—the muscle balance, so called—it is likely to be exaggerated under the strains of asphyxiation and fatigue. Whether it will break down or not depends on how well compensated it is.

This matter of compensation is of great importance not only in understanding the reactions and phenomena of asphyxiation and of aviation in general, but in civil life. Just as cardiac lesions may be well or poorly compensated, so heterophoria may be. Hence, it is not by any means enough to know that a subject has, say, 3 or 4 degrees of esophoria or exophoria to decide what the proper treatment should be. We wish to know how much prism divergence he has, what his near points of convergence and what his refraction and accommodation, whether or not the deviation is due to deficiency or to excess of convergence or of divergence, so

as to get as accurate an idea as possible of how he will take care of his esophoria or exophoria—in other words, of how effective his compensation is likely to be.

Anyone who studies the behavior of aviators under asphyxiation and under the stresses and strains of flying, and perhaps of dissipation or illness or other weakening influences, realizes more than ever before how wonderfully the human body can compensate for various defects or deficiencies at least up to a certain point; and he gets an even more vivid conviction that to achieve the most perfect compensation, so as to execute the most precise, accurate and successful maneuvers—in short, to attain the highest perfection as an aviator—a man must keep himself at the peak of condition, the acme of health and perfect training, because the tests are so sensitive that any falling off in performance is quickly apparent. I suspect that in our own work as surgeons much the same is true. We cannot do as well as we might do unless we keep ourselves in as perfect physical and mental condition as possible. And the same is true of any other calling. Thus the principle involved in the care of the flyer, as it has been worked out in the air service division of the Surgeon-General's Office, is one which should in future be applied to any department of military or civil life in which the most efficient work is sought.

3. As to the psychic side of vision, our investigations have not gone far enough to make very sweeping and positive statements, but my feeling is that it occupies an intermediate position. It is not as much affected by asphyxiation as the adjusting mechanisms nor so free from impairment as the more purely sensory. The psychologists are more competent to speak on this part of the subject, and Professor Dunlap says that, "in general, discriminative judgment shows no falling off in rapidity or accuracy except as improper motor control and attention produce it."

What, then, are the essential weaknesses which asphyxiation brings? Cardiovascular and respiratory weakness are, of course, the most important; but we are not concerned at present with these, only with the higher centers. The primary and fundamental defects are two: a decrease in sensorimotor coördination, and in range and sustention of attention.

The two sensorimotor adjustments of most importance in the physiology of vision are those of focussing and of fixation. In order to see objects clearly the optical part of the eye must be so adjusted as to focus on the retina a clear image of the thing looked at. This is done by the mechanism of accommodation. Now, the demands made on the accommodation depend on the amount of hypermetropia present. If there is none present, or if what there is is corrected by suitable glasses, then no accommodation is needed in order to focus distant objects sharply on the retina. For near objects some accommodation is needed—the more the nearer the object. The aviator rarely has occasion to look at anything nearer than ten inches—say 25 cm. This requires an accommodation of 4 diopters. The average aviator is around twenty-five years of age—more often under than over. He has, therefore, a range of accommodation two or three times as great as would be required to see anything he is likely to wish to see. This generous reserve gives a liberal margin of safety, and before it breaks down under asphyxiation and fatigue he is too nearly totally inefficient from the general effects of asphyxiation for us to be able to determine the ocular condition.

On the other hand, in case there is some uncorrected hypermetropia, the accommodation has to be called on to correct it even when distant objects are looked at; and still greater demands are made on the accommodation when the hypermetrope has to look at near objects. Thus there is some demand on the accommodation all of the time that the eyes are open. In these cases there is a greater possibility of breakdown. It is a case of compensation and a question of whether or not it will break down under the strain. It is a good illustration of the importance of knowing something of the errors of refraction of the candidates for aviation as well as their visual acuity.

The importance of the vision—far the most important sense for the aviator—led me to propose an investigation to determine the value of a method of estimating the hypermetropia without the use of cycloplegia. This was started by Major E. S. Sherman and myself. The result of the first forty cases was, briefly: only

two cases showed considerably more hypermetropia under homatropin than had been found without. The glasses recommended for these were practically the same by each examiner. Five or six cases showed more hypermetropia without than was found with homatropin. The investigation was interrupted by the armistice, but as far as it went it showed the possibility of uncovering latent hypermetropia without cycloplegia. The results as to astigmatism were unsatisfactory.

Of course the present methods of examining aviators include a test for hypermetropia. It is done by determining the near-point of accommodation. The average range of accommodation is so well known for each age that a very valuable clue is obtained as to hypermetropia in this way.

The second sensorimotor adjustment is that of fixation. It is a more involved and complicated function and the margin of safety is not so ample. Hence, it is the one most frequently showing inefficiency under asphyxiation and fatigue, as already stated.

Among the subjects under investigation at the present time at the laboratory are: Methods of judging distance, especially by stereoscopic vision, by Captain Howard; light sense, with an adaptometer designed by Captain Cobb; accommodation time, with the tachistoscope of Ferree, by Captain Wheeler; comparison of methods for measuring heterophoria, by Captain Dolman. Work on these problems is still going on and reports may be expected next June. A study of stereoscopic vision was suggested because the estimating of distances is so important for aviators, particularly in making landings. It has been assumed that the function of stereoscopic vision was an important means of estimating these distances, but I was led to doubt it from two considerations: (1) That it is no uncommon thing to find an aviator who makes good landings who has only one eye or for other reasons lacks stereoscopic vision; (2) for theoretical reasons it seemed improbable that stereoscopic vision, with the eyes only 60 or 70 mm. apart, would be able to detect differences in distances when the objects were several hundred meters away. This because the ability to discriminate stereoscopically decreases with the square

of the distance. Thus if one could detect at 25 cm. a difference of one-tenth of a millimeter, at 25,000 cm. he could detect only a difference one million times larger; this would be 100,000 mm., or 100 meters. Other means of judging distance may be better at such long range. The matter seemed important enough to investigate thoroughly, and Captain Howard has undertaken this work.

The importance of the light sense and of adaptation in night-flying is obvious. Very little work on this subject has been done. We were fortunate in having in Captain Cobb, of the Nela Laboratory, a research worker exceptionally competent to undertake this investigation.

The fact that disturbances of fixation and of binocular vision cause more visual disturbances in aviators than all other ocular defects combined is sufficient reason for undertaking an investigation as to the relative merits of methods of measuring these defects. Captain Dolman is carrying on this work; the results will be of no little value in civilian practice as well as in military.

The work of Ferree and Rand on accommodation with the tachistoscope was the most promising line of research dealing with the focussing mechanism of the eye. This was undertaken by Captain Wheeler, with the cordial coöperation of Prof. Ferree, who had the apparatus constructed by his mechanician and initiated Captain Wheeler into the methods of using it which had been devised by him.

These three lines of investigation deal with the three most important adjusting mechanisms of the eye: Fixation, focussing and adaptation to difference in light intensity. Other research was planned in color vision, the importance of which to aviators I had been led to question; and on the effect of smoking, where I expected to show that excess was harmful, but moderate use possibly in some respects beneficial. Lack of workers competent to undertake these investigations prevented our carrying out our plans.

Some problems requiring actual work in the air had to be postponed until facilities for this kind of work could be obtained, and so were never undertaken.

THE ARMY SCHOOL OF OPHTHALMOLOGY[1]

By MAJOR MEYER WIENER, M.C.

The Army School of Ophthalmology was the outgrowth of plans laid out by our distinguished and able confrère, Lieut. Col. George E. de Schweinitz, who, after several trips to Camp Greenleaf and Ft. Oglethorpe, selected the site, equipment and finally the instructors to direct and develop the school.

I arrived at Camp Greenleaf under War Department orders on July 19, 1918, and started on my course of military training with no idea as to what work I was to do, or where I was to be assigned. On July 30, I was ordered to report for duty to Lieut.-Col. de Schweinitz, as instructor in the School of Ophthalmology. The length of the course had already been determined by the proper authorities to be four weeks, and the hours from 9 to 11.30 and 1.30 to 4, daily, excepting Saturday, when the hours were limited from 9 to 11. Col. de Schweinitz thought from the beginning that the two hours Saturday morning could be taken up to best advantage with written and oral quiz and this proved so satisfactory that the plan was continued throughout the life of the school. There remained twenty-five hours each week, or a total of one hundred teaching hours for the course. I was asked to submit a schedule including two hours didactic teaching each day, which made a total of forty hours, leaving sixty hours for practical work. After several conferences Col. de Schweinitz finally determined upon a tentative schedule and the school was formally opened on August 12, 1918, with eight student officers. This

[1] Read February 5, 1919.

number rapidly increased, until at one time we were teaching a class of sixty-three student officers, taxing our facilities to the utmost.

At the time of the organization of the school, Captain Alfred Cowan and Lieut. L. G. Campbell, then serving in the eye department of General Hospital No. 14, and Lieut. M. E. Brownell lent most effective aid and the heartiest coöperation in establishing an efficient course. Later Lieut. F. O. Schwartz, Lieut. T. J. Moran, Capt. S. T. Hubbard, Lieut. Nicholson, Maj. H. M. Morton, Lieut. C. P. Dyer, and Capt Claude T. Wolfe were in turn added to the teaching faculty. Lieut. Moran, a brilliant officer of noble character and splendid training, died during the influenza epidemic, his loss being deeply felt by all who knew him.

The following schedule for the month of December illustrates in a measure the course of study outlined for the school, and from which there was very little deviation.

SCHEDULE OF COURSE IN OPHTHALMOLOGY FOR DECEMBER

First Week.

	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
9.00–10.00 A.M.	Lecture: Routine of examination of patients, by Maj. Wiener.	Lecture: Retinoscopy, by Lieut. Brownell.	Lecture: Physiological Optics, by Maj. Wiener.	Lecture: Functional Testing, by Lieut. Brownell.	Lecture: Lids and Lacrymal Apparatus, by Lieut. Schwartz.
10.00–11.30 A.M.	Practical work.	Practical work.	Practical work.	Practical work.	Practical work.
1.30– 2.30 P.M.	Lecture: Refraction, by Lieut. Schwartz.	Lecture: Muscle Testing, by Lieut. Brownell.	Lecture: Surgery of Lids, by Major Wiener.	Lecture: Principles of Plastic Surgery, by Capt. Davis.	Lecture: Surgery of Conjunctiva, Major Wiener.
2.30– 3.30 P.M.	Practical work.	Practical work.	Practical work.	Practical work.	Practical work.
3.30– 3.45 P.M.	Quiz conference.	Quiz conference.	Quiz conference.	Quiz conference.	Quiz conference.

(Saturdays, 9–11 A.M.—Quiz.)

SECOND WEEK

9.00–10.00 A.M.	Lecture: Conjunctiva, by Lieut. Schwartz.	Lecture: Cornea, by Capt. Hubbard.	Lecture: Uveal Tract, by Capt. Hubbard.	Lecture: Media and Sclera, by Capt. Hubbard.	Lecture: Fundus. by Maj. Wiener.
10.30–11.30 A.M.	Practical work.	Practical work.	Practical work.	Practical work.	Practical work.
1.30– 2.30 P.M.	Microscopic Pathology: Progressive Sectional Groups.	Microscopic Pathology: Progressive Sectional Groups.	Lecture: Surgery of Conjunctiva, by Maj. Wiener.	Lecture: Surgery of Eye Muscles, by Maj. Wiener.	Lecture: Surgery of Orbit, by Capt. Hubbard.
2.30– 3.30 P.M.	Practical work.	Practical work.	Practical work.	Practical work.	Practical work.
3.00– 4.00 P.M.	....	....	....	Lecture: Accessory Sinuses, by Major Wiener.	
3.00– 3.45 P.M.	Quiz conference.	Quiz conference.	Quiz conference.	.....	Quiz conference.

(Saturday, 9–11 A.M.—Quiz.)

THIRD WEEK

9.00–10.00 A.M.	Lecture: Heterotropia, by Lieut. Brownell.	Lecture: Functional Testing, by Lieut. Brownell.	Lecture: Pupillary Reflexes and Visual Paths, by Capt. Hubbard.	Lecture: Focal Infections, by Lieut. Schwartz.	Lecture: Fundus, by Maj. Wiener.
10.00–11.30 A.M.	Practical work.	Practical work.	Practical work.	Practical work.	Practical work.
1.30– 2.30 P.M.	Microscopic Pathology; Progressive Sectional Groups.	Lecture: Fundus, by Maj. Wiener.	Lecture: Surgery of Cataracts, by Maj. Wiener.	Lecture: Surgery of Glaucoma, by Maj. Wiener.	Lecture: Surgery of Foreign Bodies, by Maj. Wiener.
2.30– 3.30 P.M.	Practical work.	Practical work.	Practical work.	Practical work.	Practical work.
3.30– 3.45 P.M.	Quiz conference.	Quiz conference.	Quiz conference.	Quiz conference.	Quiz conference.

(Saturday, 9–11 A.M.—Quiz.)

FOURTH WEEK

9.00–10.00 A.M.	Lecture: Injuries, by Maj. Wiener.	Lecture: Neurology, by Maj. Wiener.	.....	Lecture: Accessory Sinuses, by Capt. Davis.	Lecture: *X*-ray Localization of Foreign Bodies, by Capt. Blaine.
10.00–11.30 A.M.	Practical work.	Practical work.	.....	Practical work.	Practical work.
1.30– 2.30 P.M.	Lecture: Fundus, by Maj. Wiener.	Lecture: Fundus, by Maj. Wiener.	.....	Surgery.	Surgery.
2.30– 3.30 P.M.	Practical work.	Practical work.	Practical work.	Practical work.	Practical work.
3.00– 4.00 P.M.	.....	Lecture: Bacteriology and Pathology of Eye, by Maj. Keilty (Tues.)			
3.30– 3.45 P.M.	Quiz conference.	.....	.....	Quiz conference.	Quiz conference.

(Saturday, 9–11 A.M.—Quiz.)

Practical work in the course includes: Refraction and muscle testing. Outlining visual fields and scotomata. Examinations of fundi in wards and clinic. Examination of external diseases in patients in wards and clinic. Operations on pigs' eyes and on patients in General Hospital No. 14 and in West-Ellis Hospital in Chattanooga. The talks on surgery are illustrated by lantern slides and drawings and are followed by the operation itself on animal eyes, patients or cadaver. Also practical paper work in ward and demonstration of method of keeping records and cross indexing.

The purpose of the school was two-fold: (1) To determine those who were fit for ophthalmology, from those student officers who had been either held by the Surgeon-General's Office for that purpose or had selected eye-work of their own volition. This was done (*a*) by preliminary exemination conducted by the director of the school, who decided whether the student officer had had sufficient ground-work to be accepted for the course and (*b*) by his final qualification given at the termination of the course as determined by the character of his work, both practical and theoretical, as well as written final examinations. (2) It served as a post-graduate course for those who would have ordinarily been qualified, but tended to produce even greater efficiency.

The dominant thought prevailing throughout the entire period of instruction was to instil the idea of system in the method of examination of patients and recording of cases, which always, when properly carried out, makes for thoroughness and efficiency.

I wish to state here that the men who stood highest in their profession and proved the most efficient in their work were the ones who were most anxious to take the course and expressed the greatest appreciation for what they got out of it.

One might think that a man's previous experience or standing in the community would be sufficient recommendation, but I can recall one officer who had been practising his specialty for over twenty years in one of our largest cities, with a preliminary European training, who could not even be accepted in the school, although on account of his years I endeavored to be most liberal and lenient with him. One officer, who had been commissioned

a major and who had limited his practice to diseases of the eye, did not answer one single question given him on preliminary examination. Another, who had a flourishing practice in one of our large industrial centers, and was teaching ophthalmology in an accredited university, passed such a poor examination that we could not accept him for the course. In this particular case, in which the applicant had been giving special instruction in refraction, he was unable to transpose a prescription for glasses, did not know the action of the ocular muscles and did not realize the influence the muscle balance had in determining the amount of refractive error to be corrected.

I may mention that in all doubtful cases the entire staff was consulted as to the disposition of the particular officer, and that I have access to a file containing the record of each question and the answer given by every student officer examined. Should any question come up as to the justice of our decision, occasionally when there was some doubt as to whether a man might make good or not, he was given the benefit of the doubt and taken into the course on trial. If he proved to be unworthy, at the end of a week or so, he was sent back for general duty; if he made good, he continued in the course. A few finished who were able to do careful and excellent refraction work but whose general work otherwise did not come up to requirements. These were recommended for refraction only. Others who showed unusual proficiency in operative work were recommended accordingly. An unusual opportunity was offered to grade the officers, as each case examined by them was checked up by one of the staff, and every Saturday the entire class was quizzed for one hour by the director and then in sections by the rest of the staff. On the last Saturday of the course a written quiz was given, one question or more being asked on each of the following subjects: Anatomy, pathology, optics, refraction, muscles, diagnosis, treatment, ophthalmoscopy, neurology and operations. Each week a conference was held by the staff, the grades of all the members of the class written down by each instructor and submitted to the director. It was surprising how closely these grades coincided, and it was seldom there was enough difference to even bring up a discussion. When a name

came up on which there was a wide difference of opinion by the several members of the staff, his name was recorded by the staff and his work observed more closely than before by all of us. In this manner a satisfactory agreement was always reached.

One interesting feature which developed during the later stages of the school was the quiz conference. It was found that usually the officer finished the case given him to work out in the afternoon fifteen or twenty minutes before closing time, and there would be a grand rush to get through and hasten back to the barracks. We therefore compelled the entire class to assemble the last fifteen minutes of the day and devoted the time to having the student officers ask questions of the instructors on any point which might have come up during the course of their work during the day. This gave rise at times to most interesting and, I think, instructive discussion in clearing up any hazy impression.

The close contact into which I was thrown with such a large number of men practising the eye as a specialty, impresses me most forcibly with the necessity for a more thorough and systematic course of training for the specialist.

For our own department I have thought that some of the heads of the ophthalmological departments of our leading medical schools might get together and outline a plan for a course of instruction whereby anyone desiring to take up this specialty could be assured of an efficient and effective course of training making for proficiency. I am also convinced that as a fitting climax each one should strive to secure a certificate from the American Board of Ophthalmic Examiners as a mark of his capability. I am convinced that this certificate should never be given, as is occasionally the case at present, to a man on his reputation or standing in the community, but that there should be no exception, and anyone desiring this certificate should submit to the same sort of examination.

I believe the leading ophthalmologists of the country should set an example and express their willingness to coöperate by submitting to this examination, whereby the actual worth of such a certificate would be increased many times and make its possession a goal for which one should strive.

OBSERVATIONS ON OTOLARYNGOLOGY IN THE WAR[1]

By HARRIS P. MOSHER
LIEUT.-COL., MEDICAL CORPS, U. S. A.

The paper which follows begins with a few pessimistic paragraphs on "personnel." Then it takes up the two special hospitals of the Division of Surgery of the Head and describes a day at Cape May. After this it deals with oral and plastic surgery, a subject which overlaps with otolaryngology as many of us practice it. I have tried to be generous with Colonel Blair in the division of these cases; in fact, on paper his section has control of them all, so that I feel that my observations such as they are, and fully half of them were assembled in 1915 while I was serving with the British, are within the proprieties. The subject of oral and plastic surgery finished, the paper takes up Otolaryngology in the United States, discussing in order the prevailing bacteria of the epidemics, carriers and the use of dichloramin-T. These subjects are followed by a tabulation of the number of operations, and the paper concludes with a statement of some new clinical observations made in the cantonments and a brief report on the influenza epidemic from the standpoint of otolaryngology. You will see, as the paper proceeds, that it is largely made up of pickings from other men's brains. I have tried, however, in each instance to give due credit.

About a month ago, at a luncheon where five medical officers were enjoying the comradeship which comes with service, this story was told. A ward of recently returned overseas patients at a certain southern cantonment began to manifest a spirit of superiority over their fellows who had not seen foreign service. They refused to salute officers who wore the silver chevron,

[1] Read March 5, 1919.

and were continually guilty of infractions of hospital discipline. Finally, the officer in charge called them together and said: "Your continual disregard of discipline must stop. Get the idea out of your heads that you are all heroes. There may be one among you, but he is not now playing the part. The real heroes are the people who will have to live with you for the next few years." All who have been in the service should keep the moral of this story in mind. There will be times when this will not be easy to do. I confess that it is going to be especially hard for me to manage it, because the war has stimulated a tendency which I have to preach. I have never been so strongly tempted to unburden myself as tonight, because we have just passed through one of the most dismal phases of the war—the period of demobilization. There are no illusions now. It is pretty much every man for himself. The papers are full of recriminations and investigations. Capital is being made out of every angle of the war. Writers play for sensation by marshalling half truths and by convenient omissions. We have almost reached the point of attributing every vice to the Germans and every virtue to ourselves. Greatness of purpose too often is showing the yellow streak of quick reversion to self. America has done even more than the expected thing—has played a more or less prepared part splendidly, and the goal is gained. Why is it necessary to refight the war in the gutter?

Eighteen months ago the word "personnel" meant but little to me. Since then its letters have been burned into my brain.

Special Hospitals. The Division of Surgery of the Head established two special hospitals and the Section of Otolaryngology is, of course, represented in them, The first hospital is at Cape May in this country and the second at Vichy, France. Both are housed in elaborate hotels at summer resorts. The negotiations leading to the securing of both of these places were somewhat complicated and protracted.

No. 115, as the hospital at Vichy is familiarly known to those of us in the office of the Surgeon-General, has not yet functioned exclusively as a special hospital. Before the personnel selected for it arrived the Château-Thierry drive filled its beds, as well as those

of all the other American hospitals, with general surgical cases. One of the younger Boston otolaryngologists who is with No. 115, wrote to me as a matter of news and without a shadow of complaint because he is a soldier first and a medical officer and specialist afterward, that he was busy all day long dressing compound comminuted fractures of the femur. The ward under his charge was filled with them. Had the war lasted this hospital would have come into its own. Also, had the war lasted its special equipment which it parted with at the dock in America would have reached it, and it was a good equipment even if I do say so, and even if I did pick out a part of it. If the full equipment is ever assembled—especially if it should be put into the special building designed for it—the hospital will surpass anything that I saw in France and would compare favorably with the Face and Jaw Hospital at Sidcup, England.

Speaking of specialists turning to and doing general surgery reminds me of the following story which has drifted back to the States: An ophthalmologist of No. 115, who had been swamped like everybody else with fracture dressings, said to a friend higher up, "Can you not send me something besides legs? I don't know anything about them and never look at them except in society."

Here is another story in another vein from No. 115. It comes from Pierce, the chief of the section of otolaryngology. Before he reached Vichy, and while still en route, he wrote: "Tell them (meaning his friends at home) that here I am suffering and bleeding for my country. I have just come from the Grand Opera."

There has been, however, some special work done at No. 115 because Major Ivy reported that the section of maxillo-facial surgery had treated in four months ending January 18, 1919, on which date the last patient of this character was ready for discharge, 305 cases.

Recently, I spent a day at Cape May. Briefly, this is what I saw. I arrived just before noon and walked in on Captain Berry doing a Killian and Major Frazier freeing a musculospiral nerve from a callus. There was a round up of cases after lunch for General Lyster and for me to see. First we were shown the jaw cases.

These, perhaps thirty in number, ranged from simple fractures to fractures in which there was a loss of half or even two-thirds of the lower jaw. The dentists at Cape May have a unique opportunity, as they see and have a chance to compare all the results of the different types of splints which are put on overseas. This splinting work, as you know, is one of the best American contributions to the surgery of the war.

The oral plastic work at Cape May so far has consisted mostly in operating depressed and sunken scars of the face, many of them large. There have been a few cases in which a part of the upper or of the lower lip was missing. I saw one flat nose and two cases where a bullet had gouged out one eye and then had taken away the root of the nose, leaving a furrow at that point the size of the tip of the index finger. Col. Blair says that this type of case is not uncommon. I saw it at Cape May for the first time. While General Lyster was looking at a group of fundus cases—a group which Col. de Schweinitz and Col. Parker stated they never saw equalled—I looked over the otolaryngological patients. There were some well-done radical mastoids, as was to be expected. Among the more distinctly war cases were three gunshot wounds of the larynx. Each wore a tracheotomy tube and each had a discharging sinus leading to necrotic cartilage. Dr. Jackson had kindly seen these cases and advised on their treatment. There was one case in which a small shell fragment was lying innocently deep in the pterygoid fossa and another in which a fragment lay above the level of the hyoid bone in the prevertebral space. In a third case there was a sizable fragment in the posterior ethmoid region or in the sphenoidal sinus. All these cases were without symptoms and will probably not be operated. There were three cases of partial facial paralysis caused by a bullet entering the eye or the region of the malar bone and emerging through the mastoid or taking the reverse course. Naturally, they were complicated by a partial or complete atresia of the cartilaginous canal, and it was a nice problem to decide whether operative interference was worth while. There were a few deformed or partially destroyed ears. The cases of facial paralysis

were clearing up. Major Frazier had operated one case of complete facial paralysis, anastomosizing the facial and the hypoglossal.

There were five or six cases of destruction of the upper or the lower lid or of some part of the bony framework of the orbit. The ophthalmologists had been busy doing plastic operations on these in order to restore the lids and to make a pocket into which an artificial eye could be placed. I have never appreciated before how much an artificial eye means to a patient. It makes him much less depressing to those who have to associate with him.

General Lyster, Lieut.-Col. Allen, the temporary commanding officer of the hospital, and I had dinner with Major Ingersoll and spent the evening talking war and the army.

At nine o'clock the next morning Major Ingersoll did a tonsillectomy, with the patient in the modified Rose position, and I picked up some pretty points in technic. Then came a dramatic demonstration of the methods and results of the school of lip-reading. The limitless patience and enthusiasm of the teachers is overpoweringly fine. As I first went about the hospital the patients were assembled in the wide corridors of the hotel and in the midst of their setting-up exercises. These are graded to suit the patient's disability. Soldiers with partially paralyzed arms or legs are encouraged and helped to play games in which they throw or kick a ball. Next I saw the cases of hemiplegia from gunshot wound of the brain. These patients were having their massage and their exercises in the use of compensatory muscles. Major Frazier has made a beginning at a museum of casts and drawings. I saw this and went from here to the studio where Mrs. Chesney has her plaster models of the face and her artificial ears, and where also Serg.———has more drawings of operative findings. He is a sculptor by profession, and as a side employment has made statuettes of certain members of the staff. The one of Lieut. Bigelow is an especially good likeness and very martial. A head of life-size of this officer's baby I found, on comparing it with the original, who lives in a cottage near by, to be splendidly done. I felt like asking to be assigned to Cape May in the hope of seeing

myself in bronze—or rather in bronze plaster—before I die. I went into another operation by Major Frazier and saw him fill a defect of the frontal bone by means of a graft of pericranium and outer table of the skull. Here, again, I enlarged my knowledge of technic. During my visit I saw skin-grafts cut under vaselin—the Parker method—which was new to me. If I can only apply some of the things which I have seen in the war, my patients, if I have any when I get home, will benefit largely. In the afternoon Captain Cross did a plastic of the right lower lid. I came away from Cape May feeling very proud that the Division of Surgery of the Head had fathered such an upstanding hospital.

The number of special cases which will return from overseas for treatment is roughly as follows: peripheral nerves, 5000; maxillofacial, 300; blind, 250 to 300; ear, 300 to 500; cases for instruction and lip-reading, 100. The capacity of Cape May is about 700 beds.

Maxillofacial Surgery. I should like now to speak of two things which have impressed me more than anything else that I have seen during the war in our line and kindred lines, namely, the dental work and the associated plastic work of the face. These two subjects disposed of, the remaining part of the paper will consist of a review of the otolaryngological work in this country, stressing, to use an overworked word, the subject of the prevention of air-borne infections.

In 1915 I served with the British in the First Harvard Unit. In this there was a young Boston dentist named Kazanjian. His treatment of fractured jaws was the newest surgery that we had to show the British. He is still working with the British and I visited him last year and saw his latest work. At the same time I looked in on Valadier at Boulogne, and I also saw the magnificent dental equipment at Neuilly in the outskirts of Paris. At the end of my trip I visited in England, Sidcup, the splendid. The dental surgeons are having in this war the opportunity of a lifetime. At the beginning of the war when I thought of a fracture of the jaw I thought of a fourtail bandage, or of a tin affair of my own invented in the early days of my career, or of drilling and wiring the loose fragments. Interdental splints—the splinting of the upper jaw by

locking the lower to it—the restoration of the form and function of the jaw by a vulcanite plate which allows the patient to use his jaw at once and furnishes a surface over which defects in the lip or cheek can be repaired, and the use of bone transplants for large losses of substance, have supplemented the cruder methods of treatment which were in vogue up to four years ago.

It has been learned during the war that the loss of a very large amount of bone from the lower jaw can be replaced by nature. The loss of even as much as an inch at the symphysis will finally be bridged across if the ends of the jaw are immobilized by an interdental splint. In the early days of the war, when the jaw was badly fragmented, the small pieces of bone were usually removed for fear that they would slough. Now, they are left in and in some instances are even suspended in place by various forms of apparatus because it has been found that they generally act as bone-grafts, and on this account are very pervious. The teeth have been used not only to splint fragments of a broken jaw but numerous outriggers have been attached to them and carried up into the vestibule of the nose to maintain its patency or to support the soft parts above, pending the insertion of bone or cartilage and, finally, the outriggers have been used to take off tension from plastic flaps of the face.

Any otolaryngologist who holds a position in a hospital where there are many extensive traumatic injuries of the jaws and face should put himself in touch with the present status of jaw surgery and the possibilities of the mechanical help that the dentist can give to the surgeon who does plastic work on the nose and face.

The Transplantation of Cartilage and Bone.—At Epernay, Col. de Schweinitz and I found Majitot implanting sheep's and lambs' cartilage for supports in plastic operations of the face. He keeps a supply in a weak solution of formalin, washing out the formalin before using the cartilage. Gillies at Sidcup we found using human cartilage but storing it in another way. He exhibited one patient with six pieces implanted in the fat of the abdominal wall. When he figures that he will need more than one piece of cartilage in a case, he takes his full supply at the first operation

and places it in its novel storehouse to remain there until he needs it.

The method of making a whole nose interested me very much—I am now speaking especially of what I saw at Sidcup. The first step is to take a strip of cartilage of the right shape to make the bridge of the nose and bury it under the skin of the forehead. At the upper end of this two smaller pieces are inserted. These are to stiffen the parts of the flap, which are to become the new alæ. In a month or six weeks—Blair thinks that this is unnecessarily long—it is considered that the pieces of cartilage are well established, and a flap with the embedded cartilages is raised and a skin-graft folded over a form or stent made of a thin sheet of modelling compound is placed under it, sewed in place and not disturbed for ten days. The graft produces epithelium on the under surface of the flap and over the gap in the skin of the forehead from which the flap has been taken. When the flap is turned down to make the new nose, wherever an attachment to the face is desired the new epithelium is removed. It is left, of course, where the vestibule of the nose is to come. Having the under surface of the new alæ epidermatized when the new nose is swung into place prevents much shrinking and preserves the patency of the vestibule. This method of using a double skin graft over a stent is Esser's and is not new. Neither is the procedure of burying cartilage and turning down at a later period the flap containing it new, but the war has brought these procedures into very great prominence.

I suggested to Major Ivy that he use the stent method of applying the skin-graft in the case of a soldier at the Walter Reed Hospital, Washington, who had lost the ala of his nose on the right side by a motorcycle accident. The first part of the operation consisted in cutting a flap from the side of the nose and placing a double skin graft under it. At the end of ten days the graft had taken and the flap was turned into place and fixed there. No difficulty was experienced in keeping the patency of the vestibule as is usually the case. This procedure of swinging an epidermatized flap onto the nose should be of the greatest use.

The oral and plastic surgeon more or less runs into the field of the otolaryngologist and the ophthalmologist. If the best work is to be done he should work in constant coöperation with these specialists. For instance, it takes long experience to tell how much to overcorrect in plastic operations upon the lids. In the repair of defects of the nose it is imperative that nasal drainage be maintained so that the accessory sinuses do not become infected. If any of the sinuses have been opened by a war wound and are draining through the skin of the face or forehead they must be given proper intranasal drainage if the repair work on the soft parts is to be kept free from infection. I sympathize with the ambition of the otolaryngologist to do the repair work of the face. There are, however, but a few of our men trained to do the larger work. It is not fair to the soldiers to learn of them if this can be avoided. Col. Blair and the men who have worked with him overseas and who are soon to be back in this country are the proper ones to start and to direct this kind of work. Often these plastic cases need more than one operation. The various operations which will be required should be visualized in the beginning, and the ideal treatment is to have one competent operator execute them all. These cases should not be hacked at all over the country simply because the soldier is homesick and wants to get near the place where he lives.

Those who are ambitious to do the after-the-war plastic surgery should get to Sidcup, England, and see the work there. This hospital is on the grounds of an old English manor house which has all the charm that goes with a story-book place of this kind, a large lawn, old trees covered with ivy, urns, formal walks, and a hothouse for camelias. At the far end of the lawn is the hospital, built in a simple half-timbered style, with wards radiating from a central horseshoe corridor. The buildings are painted attractively. The wards are tinted in quiet colors and have good pictures on the walls, and there are many flowers about. The colonies—Canada Australia and New Zealand, each has a ward staffed by its own medical officers. It was suggested that America come in as the fourth colony. Just think what the politicians of America would say to this! A year ago there was a good beginning of a library of

plaster and wax models of cases and methods of operation, and many water-color drawings of patients before and after operation. The records in the Canadian section were kept and illustrated by an expert artist. The diagrams, the photographs and even the lettering on the covers of the history blanks were of the highest artistic excellence. It was at this place that I first saw the double skin-graft used over modelling compound and grasped the idea of its extended usefulness in the plastic surgery of the face. It was a great temptation to accept the implied invitation of the staff to become temporarily one of their number and to ask the Surgeon-General's office for orders which would allow me to settle down in this lovely place, where the very latest advances in plastic operating were being carried out daily.

Otolaryngology in the Base Hospitals in the United States. The Prevailing Bacteria. In the United States the war from the medical standpoint has been a war with the organism of influenza, the pneumococcus and above all with the Streptococcus hemolyticus. The following striking figures are taken from Col. E. B. Vedder's prize essay on "Sputum-borne Diseases."[1] The percentages were collected in 1817, before the epidemic of influenza. When the figures of the epidemic are available they will probably be even more striking.

"Cummings, Spruit and Lynch swabbed 291 measles patients: 104 of these cases had hemolytic streptococci in their throats, and among these, 51, or 49 per cent., developed complications, including 34 cases of pneumonia and 9 cases of empyema.

"With regard to pneumonia, of the measles patients that harbored non-hemolytic types, 3 per cent. developed pneumonia; while among those harboring hemolytic streptococci, 33 per cent. developed pneumonia. This indicates that the hemolytic streptococci are to be regarded as the causal organism of most of these cases of measles pneumonia.

"The hemolytic streptococci are also the chief cause of the empyemas which have caused so much trouble during the past

[1] Military Surgeon, February, 1919, p. 123.

year (1917.) One hundred and forty-eight cases of empyema were studied at Camp Doniphan. In an examination of the exudates, hemolytic streptococci were found in 137 cases, or 92.5 per cent. Pneumococci were found in 9 cases, or 6.1 per cent.; and the Streptococcus viridans in 2 cases, or 1.4 per cent.

"Where do these streptococci come from? They undoubtedly come from the mouth and throat. In the course of a survey for meningitis made from January 1 to March 1, 1918, at Camp Doniphan, cultures were taken from the nasopharynx and about 20 per cent. of the cultures showed the presence of hemolytic streptococci in normal individuals. Cultures taken from the nasopharynx and tonsils of 38 empyema cases revealed the presence of hemolytic streptococci in 22, or 57.9 per cent. Cole and MacCallum found that a very large number of patients suffering from acute lobar pneumonia have hemolytic streptococci in their throats, and that when the infection is once started in a ward in which the patients are closely associated the streptococci become widely distributed and probably gain in virulence.

"The information that has accumulated from such observations indicates that hemolytic streptococci are fairly common inhabitants of the normal mouth and throat. They probably cause little trouble until for some reason the vitality of the patient is reduced as by measles, exposure to cold and other factors. But when the vitality is so reduced they occasion a very fatal form of pneumonia, often associated with pleurisy and empyema.

"Under ordinary conditions, in a barracks, where contact is close, these streptococci are distributed more widely like other sputum-borne organisms. The same thing occurs in a crowded ward, and here the liability to the development of pneumonia and empyema is much increased because all the patients in the ward are reduced in vitality. Under these circumstances the disease becomes frequent instead of occasional."

Major Scott and his collaborators in a paper compiled at Fort Riley deal with the causes of mastoiditis. His paragraphs on "locality infection" are striking and are here quoted. They reinforce strongly what has just been said in the last five paragraphs.

"*Locality Infection.* By the term 'locality infection' is meant the occurrence in a locality or army post of a certain organism which is found to predominate, either singly or combined, in infections occurring in that particular locality or army post. At one camp, for instance, the hemolytic streptococcus may be the organism found in the tonsil crypts, is pneumonia, in mastoiditis or other diseases, while in another camp the pneumococcus, or Streptococcus viridans may be the prevailing organism. Any one of these organisms may become virulent for a certain period and then apparently become of little consequence. However, when an epidemic of tonsillitis, measles, scarlet fever or influenza occurs then the particular organism for a certain locality suddenly assumes the role of secondary invader and becomes the predominating factor in complications. That the temporary home for this 'locality-infection-organism' is in the tonsil crypt is undoubtedly true, while the accessory nasal sinuses are at times the home of the organism.

'The spasmodic appearance of a number of cases of acute mastoiditis is not surprising when one considers the above factors as noted in cantonments. During January, February, March, April and May, in 1918, the hemolytic streptococcus was the locality infection at Camp Funston. The number of pneumonias and mastoiditis cases (requiring mastoidectomies) was so great that one could speak of it as an epidemic. The organism which predominated in both series of cases was the hemolytic streptococcus occurring in 28.2 per cent. of all pneumonia and 76 per cent. of the mastoids (cultures from the mastoid cells at time of operation). The term streptococcus epidemic therefore is a better term.

"In the recent epidemic of influenza in the same hospital, tissue cultures at necropsy showed the predominating organism again to be the hemolytic streptococcus. It was present singly or combined in 41.1 per cent. of all tissue cultures, including the lung, pleural fluid, heart blood, spleen, nasal sinuses, mastoids and spinal fluid. Blood-stream invasion occurred late in this series of cases.

"Following the epidemic of influenza, measles cases began to appear in large numbers, and again pneumonias and mastoiditis.

The primary diseases lowered the resistance of the patients and blood-stream invasion by the prevalent organism, hemolytic streptococcus, again occurred, with the resulting complications. In a series of 50 mastoiditis cases beginning in October, 1918, 22 cases were complications of measles. The hemolytic streptococcus was found in 46 per cent. of all cases.

"From the above statements one must conclude that the occurrence of mastoiditis as seen in army cantonments depends upon the surroundings of the individual and the presence of a virulent organism such as the streptococcus or pneumococcus. Further, that the invasion of the mastoid occurs directly from the nasopharynx or the blood stream."

In a series of 123 mastoid cases reported from Camp Shelby, 12 cases died of meningitis. All were caused by the streptococcus group: 7 by the Streptococcus viridans and 3 by the Streptococcus hemolyticus.

Camp Pike reported for December, 1918, a series of 21 operated mastoid cases, in all of which the Streptococcus hemolyticus was obtained from the temporal bone. The same organism was found in a temporosphenoidal abscess, a subdural abscess and a thrombus of the lateral sinus, which were complications of these cases.

There is something uncanny about the way certain bacteria remain for a time harmless and then suddenly acquire an astonishing virulence. We now appreciate that overcrowding, fatigue and chilling of the human body are important factors in bringing about this result; further than this the process is a mystery. When it is solved preventive medicine will take a great leap forward.

The Nose and Throat as the Lodging Place for Bacteria. This war was brought into startling prominence, a fact long known but never before so graphically demonstrated, namely, that the throat especially, and the nose and its accessory sinuses to a certain extent, are the primary lodging places of the bacteria responsible for the infectious diseases and those that are sputum-borne. The meningococcus dwells in the vault and in adenoid remains, and occasionally in the sinuses; the Staphylococcus aureus; the strep-

tococci (including the notorious hemolytic variety); the pneumococcus; the spirillæ and fusiform bacilli of Vincent's angina, which are responsible for the "trench mouth" and the "trench throat" of the western front and the bacilli of diphtheria; all elect to occupy the crypts of the tonsil and produce acute disease, or dwell there harmlessly, so far as their host is concerned, making him, however, a deadly companion.

Carriers. The detection and the treatment of the carrier has been and still is one of the great problems of the medical department of the army. The army is fully alive to it and deals with it to the limit of the physical endurance of its staff of bacteriologists. Next in importance comes the prevention of droplet infection, through isolation, the use of cubicles and of substantial gauze masks.

Dichloramine-T. Martin and Furness, at Oglethorpe, obtained very suggestive results during the influenza epidemic by spraying all his hospital staff with dichloramin-T and by enforcing the universal use of a substantial gauze mask. It was very significant that those of the personnel in his hospital who contracted influenza, and two did and died, either refused treatment with the spray or contracted the influenza before the routine use of the spray and the mask was instituted. Dunham, the man who freed Bar Harbor of flies and who headed the empyema commission and further added to his fame, devised a gang spray for use with troops. He demonstrated that a thousand men could be sprayed in an hour and that spraying with dichloramine-T markedly reduced the bacterial flora of the nose and throat. The armistice put an end to his work. It seems a heartless thing to say, but from the medical standpoint the war came to an end too soon.

In the extended study made in the camps it was found that nurses and orderlies were often carriers. This would seem to show that when we go back to civil life it would be a good plan to regularly culture the nose and throat of all the hospital personnel, including even the physicians. It would be worth while also to spray with dichloramin the nose and throat of every patient who comes into a hospital.

All the knowledge and half-knowledge which has come out in this war should be proved in our civil hospitals. For example, carriers should be eliminated from the hospital personnel; every patient should be proved not to be a carrier before operation; every case of tonsillitis should be isolated by putting it in a separate room, by placing it in a cubicle or by the use of a mask. Infectious cases and septic cases should have separate wards. When possible different members of the staff should operate pus cases and clean cases. There should be insistence on the use of a clean operating room, and a pus room. In our best hospitals many of these procedures are carried out as a matter of routine. I happen to know of none where the carrier problem is recognized or in which sufficiently energetic measures are taken with tonsillitis.

It will be interesting to see how long the Streptococcus hemolyticus retains its present virulence after all the army hospitals are closed and there is no more assembling of large bodies of men in cantonments.

From what has just been said it is easy to see how the otolaryngologists must have played a prominent part in this war. The section of otolaryngology was at first the busiest of all the surgical sections and at one time did 27.5 per cent. of all the operating. Its work is still abundant in certain places.

From the nature of things only necessary operations are permitted in the surgery of the army. The stock operations in the section of otolaryngology therefore, have been myringotomy, mastoidectomy, submucous section of the septum, tonsillectomy, and the incision and drainage of peritonsillar abscesses.

The returns are not all in so that the following table of operations is only approximate:

TABLE OF OPERATIONS

Mastoidectomy (simple)	2,175
Mastoidectomy (complete exenteration or radical), 3.6 per cent.	72
Meningitis (complicating mastoid disease), deaths	22
Brain abscess (number of cases)	15
Tonsillectomy	11,646
Tonsillectomy and adenoidectomy	2,396
Adenoidectomy	584
Submucous resection	3,246
Peritonsillar abscess	1,199

There were 14,042 cases of tonsillectomy with 4 deaths; 2 presumably from cocain, 1 from embolism which occurred under anesthesia and 1 from tonsillar hemorrhage.

The number of peritonsillar abscesses has been very striking. Camp Devens reported 50 in a month, and Col. McKernon states that overseas one medical officer opened 24 in a week. As the total number which has occurred in the army in the United States is 1199, there is good ground for saying that at least 1000 more tonsil operations could have been performed with benefit. The majority of the tonsillectomies have been done under novocain, procain or aposthesin, and all the patients, of course, have been adults. I consider it remarkable that so far only one death from tonsillar hemorrhage has been reported.

Thrombosis of the lateral sinus has not been very common. Three hemorrhages from the lateral sinus have been reported, caused by spontaneous rupture of the sinus, four or five days after its exposure in a mastoid operation. The monthly reports bring out the fact that the mastoiditis following measles took a fulminating course and was characterized by early, painless and severe destruction of the cellular structure of the mastoid process. More than one observer has felt that the involvement of the mastoid was often a part of a general blood-stream infection.

Holmes reported the cure of 16 diphtheria carriers by the removal of the tonsils and the adenoids and one cured by a Killian operation. He reported also 11 cases in which non-virulent diphtheria bacilli were found mixed with streptococci and pneumococci in the aural discharge of acute otitis media. Freidberg also reported a series of cases of chronic diphtheria carriers cured by operation. The above list gives the standard army operations.

Operations for the replacement of fracture of the nose, usually from mule kicks, the removal of nasal polypi and drainage of the antrum are next in frequency. A few instances of nearly all the standard operations of otolaryngology are represented in the reports from the camps. In the early days there were two foreign bodies in the trachea: a dental broach and a peanut; these were sent to Philadelphia to Dr. Jackson. A short time ago, at

Oglethorpe, a quarter was removed from the upper end of the esophagus. Tracheotomy has been done a few times for edema of the larynx, probably caused by deep infection.

The following tabulation gives an idea of the amount of work done in one of the most active base hospitals, namely, Camp Sherman:

Number of new cases treated in the ear, nose and throat department	7,210
Number of operations performed in the ear, nose and throat Department	2,227
Number of treatments given in the ear, nose and throat department	35,261
Number of deaths	10

At times rather too many secondary mastoid operations were necessary. In one series of 158 mastoid operations 28 reoperations were reported and 8 cases of facial paralysis, 6 of which were permanent. This is not a good record. Speaking of the character of the work, I said in a previous paper that, on the whole, it has been good; that it has fallen down in certain places—by this I mean that there were too many cases of facial paralysis in operations for acute mastoiditis, too many cases of reoperation, and at times, in a few places, that there was a suspicion of overoperating—is due to the fact that the otolaryngologists of the country who had the training to make the work better did not come into the service in sufficient numbers to go round.

Leaving this very brief tabulation of operations and turning to the diseases with which the otolaryngologist has to deal, the reports from the camps show that there has been very little diphtheria. Almost no erysipelas has been reported in connection with mastoid operations in spite of the fact that the streptococcus has been the reigning organism.

New Clinical Observations. A number of new things have been picked up by the otolaryngologists in the cantonments. Major F. D. Owsley described a series of cases of ulcerative laryngitis due to the pneumococcus. He saw the cases at Camp Travis and labelled the process a new camp disease. It is distinguished by a superficial ulceration of the anterior ends of the vocal cords. The

chief symptoms are hoarseness and aphonia. All of the cases responded readily to treatment with solutions of silver. Major Wells P. Eagleton at Camp Dix successfully placed a bone-graft from the tibia in the cavity of the mastoid process produced by a simple mastoid operation. Major Eagleton feels that he has a new frontal sinus operation, and Major Fetterolf has confessed to a new procedure for the resection of the nasal septum. Undoubtedly both of these operations will be reported later. At one of the base hospitals there was a run of cases of hysterical aphonia, "Whispering Willies" as they were called. They were turned over to the psychiatrist who had great success in curing them.

When I was in France a year ago I heard that Robertson had autopsied a number of cases of influneza which showed pus in the sphenoidal sinus, the other accessory sinuses being free. Major J. H. Bryan while serving at Walter Reed Hospital, Washington, went through a streptococcus epidemic, and the autopsies gave a similar finding. In addition, in one case there was an odd involvement of the epiglottis and of the larynx. In this war, therefore, the sphenoidal sinus has come more and more under suspicion. Eagleton was on the watch to duplicate these findings but in the autopsies which occurred at Dix the sphenoidal sinus was not involved.

Holmes at Sheridan and Harris at Oglethorpe have drawn attention again to the manifested advantage of the use of gas oxygen for producing the anesthesia for mastoid operations in pneumonia cases. Two other medical officers, Porter and Orton, have reported a series of similar cases which they operated under local anesthesia.

A report from Camp Zachary Taylor for the month of January, 1918, gives an account of 39 mastoid operations, 5 of the cases being bilateral. Bilateral operations were not so very rare.

Hill, in a study of the aural complications of the recent influenza epidemic at Fort Oglethorpe, came to the conclusion that in mastoid cases a drooping posterior, superior canal wall did not indicate a suppurative mastoiditis. He still has faith in the other classical signs, namely, increased purulent discharge, thickened periosteum, mastoid tenderness and edema. Major Scott, of Fort

Riley, considers that in mastoiditis the chief indication for operation is bone necrosis as shown by the *x*-ray. The *x*-ray plates which he was able to obtain were unusually clear and so enabled him to place great reliance upon them.

The Carrel-Dakin solution, which has figured so largely in the treatment of empyema naturally has been tried also in the treatment of mastoid wounds. Eagleton feels that the solution gives a cleaner wound and hastens the healing. Scott advocates a dressing of chloramine paste for mastoid cavities. Dakin's solution has been used with good results at Cape May in clearing up cases of chronic running ear.

The Influenza Epidemic. The influenza epidemic, which reached the proportions of a plague or as near a plague as this generation of physicians has ever seen, spent its virulence upon the lungs.

The following account of the epidemic from the otolaryngological point of view is from Shambaugh and duplicates the reports sent in from most of the base hospitals.

"About September 21, 1918, an epidemic (influenza) broke out in Camp Grant. The number of patients in the hospital increased from normal 500 to 3600, with a daily admission rate running up to 800. The consultation work of this department was enormous. There were over 600 cases observed with otitis media acuta suppurativa. In most cases there was a spontaneous rupture of the membrana tympani within a few hours of the onset of ear symptoms. The discharge, as a rule, appeared thick and purulent from onset, and did not have the initial stage of a serosanguineous discharge so frequently met with in the ordinary case of acute otitis media. Many of these cases were complicated by a diffuse otitis externa and very few showed any mastoid reaction. Most of the cases recovered rapidly, that is, in about a week.

"There were, relatively, a small number of cases which showed distinct symptoms of acute sinuitis. Most of the sinus cases proceeded to spontaneous recovery. It seems probable that not a few cases of acute sinus infection passed undiagnosed. Not a single case of sinus trouble required operation.

"Epistaxis was a very frequent complication. The bleeding in these cases did not become serious and no special treatment was instituted to stop the bleeding.

"Cultures were made from but a few of the cases. In three cases in which cultures were procured immediately following the paracentesis all showed a pure culture of pneumococcus. In two cases in which cultures were procured from pus washed from the maxillary sinus both showed pure cultures of pneumococcus. Cultures were made from the pus found in opening the mastoid in six cases. Four of these showed pure hemolytic streptococcus and one showed a pure culture of pneumococcus."

The initial epistaxis was a striking feature. Green found that it almost always came from a single vessel located at the customary bleeding point—the mucous membrane over the anterior inferior part of the quadrangular cartilage, but Buff found that it came from the turbinates.

Emerson had the distinction of being made commanding officer of a special influenza hospital of 1500 beds at Camp Lee, and made a striking success of it.

Eagleton experimented with suction for removing the secretion from the trachea of pneumonia patients just after death, his idea being to use it in the living if he obtained results. He found that the secretion was too thick to respond to suction.

The tragedy of the epidemic still awaits a full description. Patients were struck down with the suddenness of lightning. To say that the morgues of the hospitals were overflowing with dead sounds commonplace, because we have heard it said so often. It was, however, literally true. In the camps military funerals were taking place all day long and the hospital flag stayed at half-mast throughout the epidemic. At the railroad stations the coffins which were being slowly wheeled along or lay about waiting for a place in the baggage cars kept the scourge before the eyes of every traveller.

I remember the impression that the blue patients made on me as I went about the crowded wards at Oglethorpe. The virulence of the disease struck me like a blow when the medical officer who accompanied me said: "This man will be dead tomorrow, that one

the day after" and none of the patients seemed to me so desperately ill. The fathers and mothers; the wives and brothers and sisters sitting by the bedsides, singly or in groups, added to the tragedy and to the general hopelessness.

Only a few doctors died, but enough to show that they were not immune. At least two wives of doctors who either lived in the camp with their husbands or came to visit were victims. One very sad case of this kind occurred at Oglethorpe. The wife of the pathologist died the day before I arrived. After talking it over with his commanding officer he decided to remain at his post and carry on his work in the autopsy room, assembling material while it was still available for scientific purposes. On the day of his wife's funeral one of the visiting physicians happened to be in the morgue at noon and found him crowded with work. The physician asked if he could be of any help. The answer was: "It would help if you could stay a little. At this hour in New York my wife is being buried." That was lonely devotion to duty which words of mine cannot adequately appraise.

Leaving the service after nearly two years devoted to it, has proved to be a tender time for me. The following lines express a little of the feeling that comes with it. I take the liberty of reading them here and at the end of my paper, because I have found myself very close to some of the men in the service who now sit before me.

MY SERVICE FLAG

Today is the day that my flag comes down,
Today marks a duty done.
Tomorrow again familiar paths
Before my footsteps run.

The loving hands that hung my flag
Have been spared to take it down,
And tears that were shed in secret then
Again her eyelids crown.

My reward I find in the eyes I love,
In the mem'ries to which I've been true,
In the comradeship of kindred souls—
And my own soul born anew.

WASHINGTON, April 1, 1919. H. P. M.

SUMMARY. In the beginning of the war the section of otolaryngology was the busiest of all the surgical specialities. At the present time it remains moderately active, but the section of plastic and oral surgery, now called maxillofacial surgery, and the section of neurological surgery now receive from overseas more of their special cases than the section of otolaryngology. The section of neurological surgery is receiving by far the most cases, the majority of them being injuries of the peripheral nerves.

In the United States the two great medical problems of the war have been the control of sputum-borne diseases and the detection and cure of the carrier. The bacteria responsible for sputum-borne diseases gain their entrance to the body in most instances through the tonsils or the accessory sinuses. Experience has shown that the best method of curing a carrier is to remove the tonsils and the adenoid. The war has shown also the supreme importance of accepting in the army only recruits who have a normal nose and throat.

The war has shown further the importance not only of discovering carriers, but of segregating contacts. It has brought out the significant fact that the hospital personnel often act as carriers. In dealing with air or sputum-borne diseases the great value of isolation and the use of substantial gauze masks has been proved. The probable efficiency of the routine spraying of the nose and throat with dichloramin-T has been shown. More experimentation, however, is needed to prove this point. The opinion now prevails that every recruit and every hospital patient should be looked upon as a possible carrier.

In the United States the dominant bacteria have been the pneumococcus and the Streptococcus hemolyticus, the latter being by far the more important. The following fact has become more and more evident, namely, that assembling men in barracks, exposing them to cold, and drilling them to the point of over-fatigue has the power to change harmless bacteria into virulent strains.

In head surgery America's greatest contribution has been in the surgery of the jaw. Bridge splinting, the use of bone-grafts, the implantation of cartilage to give form to plastic flaps, and the use

of the skin-graft folded over a plate of modelling compound have greatly advanced maxillofacial surgery.

The fact that so many tonsillectomies were performed with so few deaths from any cause, and only one death from tonsillar hemorrhage speaks well for the skill of the operators and the type of operation employed. The striking number of peritonsillar abscesses would seem to show that even a larger number of tonsillectomies could have been performed with advantage.

The influenza epidemic was a dramatic and deadly scourge, but the complications produced in the line of otolaryngology were not serious. It emphasized the fact, however, that a normal nose and throat is a great protection.

The otolaryngologists have faithfully and enthusiastically used their specialty for the prevention of disease as well as its alleviation. Their first aim was preventive surgery, and they largely realized it.

In looking backward over our war experience things are seen which could have been done better. The following are some of them. Recording them may help another time, if there ever is another time:

The draft examination should have been more thorough. Too many cases of chronic running were overlooked.

There could have been closer coöperation between the camp and the base hospital. There was no provision for an automatic interchange of special personnel.

Special instruments and supplies were late in getting to the hospitals.

Instruments, medical supplies and literature were late in getting overseas.

The hospitals at the port of embarkation should be thoroughly equipped and staffed. Soldiers destined for overseas often arrive at the port of embarkation seriously ill.

In the United States the power to act as consultant should have been given to the chiefs of the sections earlier.

Each medical and surgical section should have a medical officer to act regularly as courier between the home base and the base of operations.

DISCUSSION

Dr. George B. Wood: The few remarks that I want to make in discussing this paper are drawn from experiences in the otolaryngological department at the base hospital at Camp Meade. We had a good deal of trouble with infections from the Streptococcus hemolyticus, especially in relation to frequent attacks of tonsillitis following submucous resections and occasionally after other operations on the nose. These became so frequent at times that we did some investigation as to the etiology and prevention of these attacks. We were very fortunate in having an extremely capable pathologist to take charge of the laboratory side. We found that a large number of the men who were to be operated on already harbored the hemolytic streptococcus, but the fact of these organisms being present apparently had no influence on the result following the operation. Also, we found that when there existed in the ward a case of acute infection from the Streptococcus hemolyticus the patients operated on were very apt to develop tonsillitis. By keeping our operative ward clear of such cases we avoided the tonsillitis complication. During the month of June we did not have a single case of tonsillitis following submucous resections. On the first of July there was admitted to the operative ward a case of acute Streptococcic mastoiditis, and of the next eleven cases operated on seven developed tonsillitis. It seems, therefore, that the hemolytic streptococcus found in healthier carriers is not particularly dangerous, but that when there exists an acute infection due to this organism, a spread of the infection is very liable to take place unless extreme care is undertaken to prevent contact between the patients. This contact may take place through an intermediary, such as a nurse, doctor or other person or through the promiscuous use of dishes, towels, etc. It is, of course, possible that infection may be carried a short distance by coughing, but I believe that the theory of droplet infection is not quite as dangerous as has been suggested in some papers recently published. In this relation I should like to relate the experience of Major Teague, who personally told me of his work in Manchuria with the pneumonic plague. He believed that one foot would represent the danger zone of coughing, and that in order to infect culture media and guinea-pigs, he had to bring them within six inches of the patient's face when coughing.

We tried dichloramin-T in acute coryza, with very little success either as a prophylactic or curative agent. We did find, however, that Dakin's solution was a very valuable remedy in clearing up mastoid infections. The use of dichloramin in carriers gave good results with the meningococci, but had little effect with the Klebs-Loeffler bacillus.

Lieut.-Col. V. P. Blair: I was passing through Philadelphia, when Dr. Roberts suggested that I come to this meeting tonight. I did not hear Colonel Mosher's paper, and I do not know that you would be interested in a few facts that I might state. The whole basis of our plan of taking care of these injuries was on the theory that if we could get the patients early there should be no reason why in the majority of instances we should not get early healing and save them from the reconstruction class. There is no place in the body where tissues heal more kindly, either bones or soft parts, than in the face, and no place is more resistant to infection. In Europe they are not as well supplied with dental men of the higher class as we are in this country. In almost every hospital in France in which I saw good dental work being done there was a University of Pennsylvania man back of the work. To take care of these injuries one must be able to splint the bones. In the great majority of instances the only way that can be done is by a splint attached to the teeth, and there are few surgeons who can do this. A surgeon in dealing with a compound fracture of the leg can put on a splint and at the same time take care of the soft parts, but unless a surgeon and a dentist work in coöperation this cannot be done with the face and jaw injuries. During the war there had been developed to a high degree the plan of giving early treatment to all wounds except face wounds, and we attempted to give the same plan of early treatment to the face and jaw injuries as was given to other types of wounds. In order to do this we had to have surgeons and dentists who would work together. As a matter of fact that plan could not be carried out completely. When we got into the war we got in so suddenly and were short of medical and dental personnel. After the St. Mihiel drive our organization was in pretty good shape. We had in almost every advanced hospital a good dental man; we had a consultant driving around from hospital to hospital, so that in most cases these patients got good early care. The last case I saw operated on in France was in an advanced hospital. I stood by without their knowing I was there and watched one of our dental men and the surgeon take care of one of these bad injuries such as Col. Mosher has shown you. The case was that of a man shot through the face; the chin had been cut down into the neck and the jaw bone shattered. If that type of case were not restored within three or four days all the fragments and raw surfaces would become infected. By means of a wire splint they moulded up the jaw, bringing all the fragments together in place. The floor of the mouth and chin were repaired and it looked as if there were a good chance of healing with only a small defect in the lip. I think the reason that there are not many bad injuries to deal with in this country is that they have been well cared for on the other side. In most of these cases there is not so much a great loss

of tissue as distortion from scar contraction. We have in this country about 500 of these cases. I have no accurate idea based on records of this war how many face injuries we had, but they probably will not be over 1 per cent. of all injuries. If the war had gone on I think we would have been able, thanks to the coöperation of the dental men, to get this type of surgery everywhere on the same basis as that of any other surgery.

Dr. S. MacCuen Smith: One of the outstanding advances of this recent war, from a medical viewpoint, has been the recognition of otolaryngology as a specialty in the United States Army. Fortunately, in Surgeon-General Gorgas the medical side of the Army was presided over by a man of broad views and receptive mind. It was necessary, however, that the value of otolaryngology in the army should be brought to the attention of the Surgeon-General's Office, which duty fell to the lot of Col. Mosher and his associates, and it would be superfluous for me to enlarge upon their efficiency in this matter. The medical profession cordially recognizes Col. Mosher's untiring efforts in his important work in the Surgeon-General's Office, and they will gladly give him a vote of thanks for his devotion to duty.

The resumé of the work in otolaryngology performed in the army, both at home and abroad, and the deductions presented by Col. Mosher are both interesting and instructive. However, the statement that drooping of the superior-posterior wall as a well-recognized symptom of mastoid disease had fallen somewhat into disrepute deserves challenge. Some of the aurists in our cantonment institutions who have failed to find this evidence of mastoid disease have probably overlooked the fact that drooping of the superior-posterior wall is present only when the higher cells, and more particularly the mastoid antrum are involved. This does not in any way alter the fact that if the disease is confined largely to the tip the above-mentioned sign will not be present, but the case requires operation just as urgently.

A DISCUSSION OF SOME SOCIAL AND ECONOMIC PROBLEMS RESULTING FROM ACQUIRED DEAFNESS[1]

By WENDELL C. PHILLIPS, M.D.

In the natural order of events the otologist's chief concern is to preserve or restore the hearing function. The anatomy of the hearing apparatus, the physiology of audition, the surgery of this department of the human mechanism, and his vast studies relating to the treatment of aural affections as well as to their prevention, consume his energies to such a degree that he is prone to overlook the social and economic problems arising from acquired deafness. Our chief efforts end with conservation.

When we consider the large proportion of deaf patients who receive slight if any improvement as a result of our ministrations and that the vast majority of these unfortunate individuals are obliged to face the consequences of the inevitable progress of the disease, it becomes apparent that even the otologist who has an intimate knowledge of the misfortunes of these people may well stop to consider and consent to assist in an organized effort for the betterment of their lives.

These patients require something further than conservation; they need more than can be obtained from the ordinary methods of treatment of the deaf. In short, we should be as much interested in the social and economic problems pertaining to deafness as we are in the treatment of aural affections. Love has well said "that it is important to attempt to cure deafness, but it is just as import-

[1] Read March 5, 1919.

ant in the meantime to aid the deaf individual to attain a certain degree of happiness and usefulness."

I need not call your attention to the close association between deafness and despondency, even in those who are but partially bereft of the hearing function. The hypersensitiveness, despair and heart-sickness of deaf individuals, especially when they must in all honesty be told by the otologist that nothing more may be expected from treatment, leads to the query, "Cannot these patients be readjusted and brought back into lives of hapiness and usefulness?" We are too prone to look upon deafness as a rare condition, when this is not the case, for statistics show that partial deafness is exceedingly common. The twelfth United States census returns show that 89,287 of our inhabitants are totally deaf. But to this 89,000 totally deaf individuals must be added the far greater array of those who suffer from partial deafness which interferes seriously with pleasure and occupation. It is estimated that in the city of New York alone there are at least one hundred thousand people who are more or less incapacitated as a result of hardness of hearing. Probably 80 per cent. of these are of the working class, and all are in constant fear that their deafness will be discovered and their earning power lessened or lost, and untold unhappiness, apprehensiveness and despondency result.

I have recently obtained a list of all the institutions which have been chartered or otherwise organized for assisting the deaf people of our country. They number about thirty, and the majority of them are organized in the interests of the deaf-mute. It has been definitely settled by social workers that the deaf-mute and the acquired deaf person differ so much in viewpoint that it is unwise to make any attempt at combination in societies which may be formed for their relief. Among the partially deafened there are very many individuals in the leading professions, in the business world and other occupations of great prominence (actually among physicians also) and these leaders in the community who have had every advantage of life and training and environment can scarcely be expected to permit themselves to be classed with

deaf-mutes. Many others of the above mentioned organizations are merely homes or religious institutions for aged and infirm people. Almost none of them have seemed to fully comprehend many of the social and economic problems which are to be brought to your attention tonight, and until a few years ago no organization had apparently made any attempt to solve the problem.

About eight years ago a small company made up of hard-of-hearing persons in New York City attempted to form an organization which might meet the demands and necessities of the hard-of-hearing people. Later on some of our otologists and other hearing people became interested. Its main objects were: "To assist the hard-of-hearing in the matter of procuring and obtaining employment; to provide full and part scholarships in lip reading; to alleviate the social isolation of the hard-of-hearing, and to assist them in every way." They have cleverly styled themselves the clearing house and information bureau for all subjects connected with the hard-of-hearing. Their labors are conducted under four headings: educational, employment, welfare and industrial

Under the educational department they have a study club for lip-readers, lectures and Sunday talks, and they also do valuable propaganda work.

The employment department operates a free employment bureau for hard-of-hearing persons. During recent months this bureau has coöperated with the United States employment service. Experts give vocational advice and help to readjust ideas. They conduct a publicity department, gather statistics and do follow-up work.

The welfare department conducts clubs for young people, card clubs for older people, gives entertainments, relief loans and supplies clothing and hearing devices.

The industrial department conducts a handiwork shop where the work of the members in all parts of the country is received and the articles are sold at moderate prices.

All applicants for membership in this organization present individual problems which are carefully worked out by expert workers. An advisory board of otologists freely devotes time and advice

whenever needed. I have become deeply interested in this organization, which has been chartered under the name of the New York League for the Hard-of-Hearing. Its work has been so successful and far-reaching, the results have been so satisfactory and its growth, from a few members in 1911 to over 550 at the present time, speaks well for its efficiency. Already branch leagues have been formed in Chicago, San Francisco, Los Angeles, Pittsburgh, Newark and Philadelphia.

The work so successfully carried out locally gives promise of far-reaching results whenever arrangements can be made to extend its usefulness throughout the nation. Plans are now being laid to form a national organization and within a few weeks we hope to commence the work of extension into all the States of the Union. This work must largely be accomplished by hard-of-hearing persons, but experience has proved that the coöperation of otologists is a great help. At least there should be advisory boards of otologists in every constituent organization, and later on it is our belief that several problems of research work may be undertaken. Furthermore, this organization will be able to be of immense help in extending our propaganda for the prevention of deafness in children.

MENTAL AND SPIRITUAL READJUSTMENTS OF ACQUIRED DEAFNESS[1]

By ANNETTE W. PECK, M.D.
CORRESPONDING SECRETARY OF THE NEW YORK LEAGUE FOR THE HARD-OF-HEARING.

You have just heard from Dr. Phillips of the great work of social service which the New York League for the Hard-of-Hearing is doing and of the American League for the Hard-of-Hearing which is being organized to spread this service of reconstruction into every town where there are people whose damaged hearing interferes with their happiness and their earning power—and there are such people everywhere. At a conservative estimate there are 100,000 in New York City. Three hundred who live in and about New York are members of the League, but we have assisted many more.

All of us whose hearing fails must be readjusted to life and to work. This begins necessarily with a change in the mental and spiritual attitude and works out toward the high objective of the poet who said:

"Help me to need no aid from men,
That I may aid such men as need."

Readjustment is the preparation for complete reconstruction. It means not only what is done for us, but what no one but ourselves can do for ourselves. If we refuse, retribution is certain and, it may be, terrible.

In the five years since the League has had its own office I have talked with at least a thousand deafened people, and from this

[1] Read March 5, 1919.

observation, as well as from my own long experience of impaired hearing, I find that our faults, the foes of our own household, run in certain channels. The peculiar burden of acquired deafness is that its victims become odd, if not eccentric. I leave it to the otologists to account for this and to make kindly excuses for it if they wish. But while we recognize it we refuse to palliate it; instead, we wage war upon it. When we have relieved a man's material needs it is our part to help him fight our common enemies —depression, timidity, reluctance to take the initiative, hypersensitiveness, exclusiveness. All these are antisocial, but none the less attractive to the deafened.

As an example of hypersensitiveness, let me cite the case of a man who has been under our care for a year or so. He is totally deaf, lonely, poor and old, and has been so long out of the current of human life that he has become hypersensitive to an extreme degree. He attended the Christmas party given at the League for our older working people. At this party some seventy-five were present ranging from manual laborers to high-class office-workers. On account of their age and deafness these people have no recreations other than those the League provides; most of them are very poor and our simple refreshments mean something saved in food money. We gave them a light supper, a Christmas tree, with gifts and an entertainment of carols and addresses. Now we dearly love to have friends come and sing to us in our own club rooms, where we can hear better than in a concert hall and where our deafness is not so conspicuous. Our sensitive man, however, was indignant and told one of the workers that singing was a mortal insult to the deafened, that the singers were mocking at us. On the other side of the room sat an old woman, just as lonely, poor and deaf, but her pleasure at being a guest at a real party shone from her face and made her a delight to all who looked her way. She has not grown suspicious or hypersensitive under her affliction and it was a joy to see her, in her laces saved from better days, with her beaming benevolence.

Through dwelling in such faults we tend to grow morbid, and then useless—useless to the working world, useless to ourselves,

useless to others. No worse fate can be imagined than the deterioration which follows uselessness. That deafened people need not be useless is proved by the records of our employment department. We have succeeded in convincing about 300 business houses that our applicants are employable and this is what they say about them: "A hard-of-hearing person is an asset in a business office because he concentrates better than others. He is more efficient at general routine work because he is accustomed to monotony and isolation. He does more work in less time in the factory than a hearing person because he does not engage in the constant chatter going on about him. He is reliable and appreciative of his employer's efforts to train him because he recognizes his limitations and does not seek constant change."

Therefore we must fight with determination (indeed, most of us do) for ourselves and for others to develop spiritual antidotes to these poisonous enemies of ours; to be cheerful, to fill our lives and other lives with interest, with fun and joy; to be big so large of mind of heart and soul that we cannot see anything small and mean; to be friendly in spirit to all who come our way, and especially friendly to new ideas. We have examples among our people too numerous to mention of just such great-souled, kindly, deafened men and women, who are passing on their own fine readjustment to others, remembering that we hard-of-hearing all make little mistakes; in our human intercourse we have to leave a wide margin for little human failings. It will not deeply injure our efficiency to let the little smiles make up for the little losses. There are about thirty-five of these readjusted men and women giving regular time each week or working regardless of time when some particular project is afoot. Among them are professional and business men in active life; women of position and means whose impaired hearing limits them socially and whose gracious charm is thus given to the helping of our people.

But in addition there are things we must not permit ourselves to do. The hard-of-hearing must not go to sleep—it must never be "nobody home." We must be alert, all eyes of the body and ears of the spirit. We actually can and do develop a sixth or

seventh sense that lets us get the drift of what is going on about us. We may have deaf ears, but there is no excuse for being deaf all over or for thinking that other deafened people are.

About two years ago a man came to us with a tale of temporary embarrassment and a real estate deal which would presently be put through and relieve the situation. The story was so moving that a well-known social worker who heard it made him a loan from a fund which she had for such cases; in fact, the story made the rounds of the League workers, until a year afterward he told it to me, quite unaware that I knew his relations to the League in detail. He was rather painfully surprised when I asked, "Is that the same old deal that was to come off in a few days—*last year*?" Soon after he made up his mind to accept one of the numerous jobs we had offered him and settled down comfortably to peel vegetables at one of the big New York hotels. But with "three square meals a day," and a new suit of clothes and attendance at our club meetings, the belief that other deafened people were all dead ones revived, and I heard that he was posing as a wealthy bachelor, although he must have known that all the workers were well aware that he had a wife and family somewhere. We had to prick that little bubble, too, for some of our not-so-young working-women were hopefully accepting his attentions, and we hated to have them disappointed. We are carefully watching this man; his readjustment is not complete, but we think we see improvement.

To continue, we must not be forgetful, or at least we must sternly limit our indulgence in this common failing. For hearing people always say, "Oh, she didn't understand." And please remember that to question our intelligence is the uttermost gall and wormwood to the hard-of-hearing and calls down more curses upon the hearing than any other single eccentricity of theirs.

Finally, we must not let our hearing friends do too much for us; they mean well, but they hinder the development of backbone. We should do our own shopping and interview our own janitors; it is not difficult if we make up our minds to it. We must never return without the facts we set out to get. The one thing above all others is to build up an independent life—useful, joyous,

loving—but always independent—"To need no aid from men, that I may aid such men as need." As with the educational construction toys given to children so we may choose for ourselves what kind of a life we will build with certain given materials. We may even, if we will, build our share of the temple of the spirit where man may draw near to God.

I have referred to the retribution wrought upon the hard-of hearing by the cultivation of these deadly foes within, or what amounts to the same thing, by following the line of least resistance. We see in our social work case after case in which those who refuse to readjust become more or less mentally unbalanced. In the past month, out of forty people coming to us, five were in this condition. One pronounced type is that of the elderly person who lives alone in a rooming house, cooking his own meals, living upon savings or doing some kind of work where he is more or less by himself. After fifteen to twenty years of this isolation (and it is by no means rare) two out of three are not normal. Our clubs and recreations and, above all, the friendliness of our workers often bring such wanderers back. One woman we know could not, or would not, work amicably in any of the numerous positions obtained for her; one man had become so morose and suspicious that he always left a job in a few days, declaring that the foreman had insulted him. Another lonely woman developed hallucinations and had to be placed in a State Hospital. The pressure of such sad cases has, however, its lighter side. A telephone call came in at the end of one busy day when no less than five of this type of deafened persons had been interviewed. The voice on the wire inquired, "Have you any pineapples?" "No," said our weary employment secretary, "but we have plenty of nuts."

It is the League's great privilege and mission to enter here, to save while we serve, just as far as we can. We have under our care at present a young woman of thirty whom we are trying to restore to normal life and thought by regular employment and healthful recreations among other young people. She came to us a month ago, a shy, hunted thing, afraid of everybody, particularly afraid of older people who seemed to be in authority. Her home

was visited by our welfare workers, who studied the situation and advised a job. Our employment bureau obtained it for her, one of the secretaries going with her to interview the employer. She is now working at light factory work and attending parties fearlessly and with pleasure, surely on her way to reconstruction.

Our clubs not only provide healthful recreation but push on the great work of spiritual readjustment. One man, who had been growing afraid of people, started in after his first meeting to welcome others, and he is now trying to form a League up in Connecticut. Another young fellow was unpleasantly slovenly; he is now as tidy a lad as one could wish to see, and is never weary of doing helpful little things. A Sunday afternoon club gives helpful non-sectarian talks, with attendance which has grown in three months from six to fifteen. This is organized to meet religious needs and one of our hopes is that we may do this more fully in the future.

Our task, then, in social work for the hard-of-hearing is, first, to readjust ourselves, industrially, if need be, but always spiritually, and having done so, to see that everyone who needs this help has it. We need to be, we must be, in order to compensate the world for our deafness, as kind, as gracious, as capable, as alert as the hearing person is at his best—but we must be all these all the time, and even more.

PRACTICAL ASPECTS OF READJUSTMENT OF ACQUIRED DEAFNESS

By ESTELLE E. SAMUELSON
SUPERINTENDENT OF EMPLOYMENT DEPARTMENT OF THE NEW YORK LEAGUE FOR THE HARD-OF-HEARING

It is my privilege to present to you the numerous phases of social service for the deafened. I know of no better approach than to sketch briefly our work. Should my discussion terminate there, we could not but feel that an opportunity to enlist your invaluable services in this movement was lost. Social service for the deafened should and must begin with the otologist.

We represent an organization which does social service work among those afflicted or blessed with acquired deafness. We are a clearing house and information bureau on all subjects connected with acquired deafness. When we incorporated, in 1912, seventeen persons signed our charter. Our membership now is nearly six hundred, less than 10 per cent. of which are hearing. This by no means includes all we serve. We serve non-members as well as members. We serve regardless of race, color or creed and people of every walk of life. We have about ten thousand callers a year. Our field of endeavor is entirely new and heretofore unforged. Our work logically divides itself under four heads: Industrial, educational, welfare and employment and vocational readjustment.

Our industrial department constitutes a needlework shop which sells the handwork of hard-of-hearing women. This shop transacts a business of about $1400 a year and affords an opportunity for these women who are unable to enter the commercial world to add to their income.

[1] Read March 5, 1919.

Welfare work means, first and foremost, an effort to remove the horrors of loneliness so well known to deafened people. The one and only place I know of where the deafened man comes into his own is in one or all of our recreation clubs, maintained by our welfare department. In these we meet the needs of all we serve. There are four clubs, a Young Peoples' Club, a Women's Club, a Men's Club and an afternoon Card Club. The Young Peoples' Club has a monthly attendance of 120, the Women's and Men's about 80 respectively and the Card Club about 50. Here deafness is an entree, not a bar. They play games, dance and make merry together. They converse freely by lip-reading or pencil or with the aid of a hearing device.

It is in these clubs, as well as at our desk, one is told about the doctor who told me "not to study lip-reading because it would make me deafer. You would concentrate on the lips and neglect to use your ears." Those of us who know better retaliate: "Lip-reading does not take the place of ears; if anything, lip-reading helps you hear better and retain whatever hearing you have. If you use your eyes and ears together you lessen the nerve strain. Relaxed nerves and better physical condition mean better hearing."

Our welfare department also does case work, procures aural and medical attention and a hearing device for those who need it. Within a period of six months we have procured expert treatment and diagnoses for about twenty people from our board of otologists and clinics.

Recently a young girl earning a salary of $15 a week, and having to contribute to the support of her home, decided to purchase a hearing device for $150 on the installment plan, because she was told that the use of one would reëducate her ears and help her hear. When the girl came to us, five years ago, she was hard of hearing, but rapidly grew deafer from day to day. She is a fairly proficient lip-reader. No amount of talking could persuade her that the instrument was useless to her. If when talking to her you allowed her to see your mouth she could, she thought, hear through the instrument. She was finally persuaded to consult her otologist. Unknown to her he was acquainted with the details of the case.

It was only through his influence that she was saved from her own folly.

Our educational department undertakes the encouragement and promotion of the study and the practice of lip-reading. The department grants scholarships, instigates the opening of free public classes, conducts lectures in the League rooms, public evening schools and public lecture halls. The educational department has granted seventy-two scholarships in its history. We are compelled to limit our scholarships to only such as must have individual attention. The educational department is actively engaged in endeavoring to procure better conditions for those who are studying in the evening schools. They want proper lighting, seats, smaller classes and shorter lesson hours. There are about 175 pupils attending these classes each year.

Last, but not least, is our employment and vocational readjustment department. It is in this department that we do and can come into close contact with the otologists. An individual who would not come to us under ordinary circumstances will come for employment. If he does not come himself he is sent by doctors, charities and public employment bureaus.[1] In 1912, when the employment department was established, we placed 20 per cent. of our applicants, which is 2 out of 10. In the year 1918–1919 we placed 85 per cent., 220 out of 261 who applied. We have about 300 firms which have coöperated in giving the hard-of-hearing employment. In order to accomplish this we must "beard the lion in his den." Well do we know the sensation of approaching the door of some busy man's office, trying to make up one's mind to enter or run away. We enter only because it is our "mission in life to make the world a decent place to live in"—no, I mean a decent place for the deafened man to live in. The interview is something of this nature:

"I have a woman, well educated, has been a teacher of languages and mathematics for six years. She is a good typist and has a knowledge of Spanish."

[1] We are a branch of the U. S. E. S. of the Department of Labor and all h. h. applicants are referred to us. During the war we coöperated with the Red Cross Home Service in the placing of deafened wives, mothers and sisters of men in the service.

"Send her along."

"I want to tell you that she is hard-of-hearing and could not accept the position if she was required to answer the phone or interview many people."

"Do not take up my time; I cannot be bothered with her kind."

"Pardon me, sir; but you are talking to her kind right now."

"What, you deaf?"

"Yes, but I can lip-read and so can my applicant. Other employers have told us that a hard-of-hearing person is an asset in a business because he concentrates better than others, he is more efficient at general routine work because he is accustomed to monotony and isolation."

And then he says: "Send her along."

Just one day, after a one-armed, totally deaf man walked into our office, he was taken by the hand by one of our workers and placed within three hours at a salary of four dollars a day. Last week he reported an increase of two dollars a day in salary. With little readjustment we place our applicants in practically all lines of work. We have had correspondence with individuals all over the country on vocational readjustment and have helped many to readjust themselves. At the present time one of our workers is carrying on a correspondence with an ex-officer of the aviation corps who has been slightly deafened in service. She knew him socially. He told her that he had come across a great many men deafened in flying at great altitudes, but who do not realize or will not admit it. He for one will not recognize the limitations of his deafness. He has refused aural attention. He is now seeking employment in his own State. Our worker has suggested several openings, such as insurance agents' work or salesmanship, any one of which would bring home to him a recognition of the need of readjustment to his deafness in a very short time. He contemplates entering college in the fall. He must before then appreciate the difficulties of pursuing any college work with impaired hearing without the aid of lip-reading.

This department collects statistics of the various types of deafness and the treatment of the individuals who come to the bureau.

It is surprising to note how many suffering from a peculiar type of deafness are pursuing work which tends to increase or aggravate this condition. We are powerless to control this most times, but one word from the aurist, who has them in hand before we do, would prevent most of this. We know for a fact that a number of women suffering from catarrhal deafness were serving as ticket-choppers in the subway and on elevated stations last fall, exposed to colds, draughts and dampness.

A case worthy of special attention is that of a young boy, eighteen years of age, who came to this country eight years ago. He entered school and remained there for six years. At the age of sixteen he had a mastoid operation, which left him hard of hearing. He did not know it and his parents in their ignorance did not detect it. Upon returning to school he found that he was the laughing-stock of the class; at home he was the fool. The boy ran away from home and came to New York. Here he was picked up as a truant for non-attendance at school and vagrancy. He was put in the hands of a probation officer to be placed at work and forced to attend school. Through this source his deafness was detected and he was referred to us. We found employment for him; we are helping him to find himself. This boy could have been saved much agony by a little social service on the part of the attending physician in the hospital.

I have barely touched upon our work. Much remains for us to do, but we cannot progress very far without your aid and coöperation. We need your help to restore independence, self-confidence, refreshed life and joy to the deafened. Will you not adopt the slogan of one of our New York aurists, who calls us on the telephone and says: "I am sending one of my patients to you. Give him what I cannot give him."

DISCUSSION ON THE PAPERS OF DR. PHILLIPS, MISS PECK AND MISS SAMUELSON

Dr. Francis R. Packard: Of all the many phases of social-service work as carried out in hospitals and elsewhere, none is better calculated to do good as the one outlined by the speakers. I feel that those of us who have to do with deaf people ought to experience some chagrin that we have not sooner seized the idea and developed it in the same way as has the little group in New York referred to by Dr. Phillips. I think we are particularly fortunate in having this plan presented to us by two of those who have suffered from the malady and who have found what a great benefit and blessing the organization which they represent has been to them. We all are familiar with the workings of institutions for the treatment of deaf-mutism, some thirty-six in all, in the United States. They are probably sufficient in number to care for most of the people who are born deaf or who become deaf in such early years that they are considered as congenital deaf-mutes; but there is no institution to care for those who have acquired deafness later. Every one of us is familiar with the degree of hypersensitiveness of the deaf contrasted with the happy disposition on the part of the blind. The blind person lives in a little world of his own; the deaf person constantly sees people enjoying sounds; also he constantly sees the expressions of impatience we are liable to make when we are not distinctly understood. He has his malady constantly rubbed in. He does not wish to subject himself to such conditions, and unless something is done to bring him into the working world he becomes morose and unsuited to be of service to himself and others. The subject is not one that admits of elaborate discussion, but one point to be especially emphasized is the value of the early acquisition of lip-reading. This relieves the tension of trying to hear people speak. Hearing devices are more of a strain and of less advantage than an early acquaintance with the motion of the lips in making words and the ability to use their eyes to replace their organs of hearing. I am glad this has been mentioned, because we hear the argument advanced that the deaf should not begin early to study lip-reading lest they do not use their ears. I hope that all doctors and laymen will try to coöperate in making successful this movement, started by a small group in New York, and aid its extension to all the neighboring cities and those of the far west.

Dr. S. MacCuen Smith: The fact which impresses me most markedly is the cheerfulness which Miss Peck and Miss Samuelson manifest and bring to their work, and this has added very much to their success, for

we all appreciate the despondent tendency of the hard-of-hearing. I should like to ask these two young women whether they advise the use of an aid to hearing early in the process of losing the hearing. It has seemed to me that the early use of an aid to hearing establishes premature dependence upon it, owing to the fact that the organ of hearing becomes accustomed to the increased sound and thereafter progressively fails to appreciate lighter sounds.

I wish to take this occasion, as Chairman of the Section on Otology and Laryngology of the College of Physicians, to express the appreciation of the section, and, I doubt not, the appreciation of the College, of the kindness of Dr. Phillips and these young women in coming here and giving this practical demonstration. I feel also that all the aurists of Philadelphia will be glad to help in furthering the cause when it is established here.

Miss Samuelson: I would like to answer the question whether an aid to hearing would be advisable in the first stage of deafness from my own standpoint. My experience is that it is not practicable, because I have tried every hearing device on the market. I found that when I was just a little deaf I heard everything in a room except the voice. In the theater I could hear the walking across the stage, but I could not hear the words distinctly. The raising and lowering of seats also proves distracting, and is much accentuated by the instrument. I get the sounds of the voice without the instrument. This I find to be the experience of a great many people. I believe one must be quite hard-of-hearing to use the instrument with any satisfaction.

Dr. Wendell C. Phillips: I believe that the gradually growing deaf person may well learn lip-reading for the reason that it lessens the strain. All otolaryngologists, I think, say not to use the hearing device until it is necessary. We know that in certain types of deafness it cannot be used at all. Miss Peck's deafness is the result of otosclerosis, a family defect. She has one sister who is deaf; her father also is deaf. While the instrument is not entirely satisfactory, yet she hears very well with it, and she has made a great study of hearing devices. She has with her now the newest and largest form of the electric hearing devices, and one that has absolutely no "rattle."

Dr. B. Alexander Randall: We should know something of the statistics concerning the number of people who are deaf. It has been claimed by Troeltsch that one adult in three is somewhat deaf in one or both ears, and we find that examination confirms this very fully. I

have heard the statement pooh-poohed, but in a group of ten disputing the assertion seven were deaf in one year. Thus we realize to what a great clientele a society such as mentioned tonight is rendering service. As to the disposition of the deaf, it should be borne in mind that the nervous strain under which they live is very great; that they become fatigued; if they are lip-readers, they must close their eyes for rest; if they are using their ears, they must close their ears and recuperate before they can continue the strain. A large part of the sensitiveness of the deaf is due to the fact that it seems to them that everybody is whispering, leaving them out, probably saying something about them. If you will consider that element of the matter you will realize that it takes more than the usual amount of the milk of human kindness to keep the deaf well-disposed and capable of accepting the conditions surrounding them. All of us, as has been said, have been impatient of the deaf. We say, "You must be deaf," but we mean "You must be *dumb*." That, I think, is our attitude toward their mentality.

Regarding the electric appliances, in spite of much that has been said by those who make them and advocate their use, their value is mainly in transposing the speech to higher pitch. Low tones are not heard by those whose deafness is due to impairment of the conducting apparatus. As with the telephone, the raising of the pitch of the sound brings it within the range of their hearing. Yet the fatigue resulting from the effort to hear often prevents the deaf person hearing. So all that relieves fatigue helps. We know that the inventor of the microphone uses a big "tin dipper," in order to take in a large volume of sound.

Dr. Wendell C. Phillips (closing): It would be well to emphasize the point made by Miss Peck that there is quite a proportion of the advanced deaf people who are cases of border-line insanity. It requires rather fine judgment to determine which these border-line cases are. I have had considerable experience with this class of patients. Such patients, for example, will come to you saying there is something in the ear. To illustrate, I had a patient in my hospital service who insisted that she had a bed-bug in her ear which she had come to me to have removed. I found that she had been to a number of institutions on the same quest. When I told her there was nothing in the ear she immediately intimated that I was incapable of doing the work of an otologist. It was evident that the supposed bed-bug was more mental than real. In an endeavor to satisfy her I told her to come back on the next clinic day and in the meantime I had one of the attendants secure a bug of the species designated. This I withdrew from the ear and for the time being she was satisfied. I have no doubt that she is in an

insane asylum today. Many patients complain of hearing sounds which do not really exist. These imaginary noises are often the first symptoms shown by these border-line cases.

I trust that from this little talk interest may be taken in this work. I do not know of any line of effort which does more for this class of patients. I believe the work has been begun in Philadelphia, and I bespeak for it the assistance of the otologists of this city.

Miss Annette W. Peck: I should like to say something about lip-reading in connection with the hearing instrument. We have in our office besides myself four young women, and they are all slightly deaf; one of them is not a lip-reader; the other three are put right back in the hearing class by their lip-reading. If they are looking at you, you would not know they were deaf. The girl who has not studied lip-reading yet is distinctly hard-of-hearing. I never advocate the use of an instrument in the case of slight deafness; lip-reading should be studied in preference. In my own case the instrument saves my eyes. I am busy from nine to five every day, and by alternating the use of the instrument I secure the rest for my eyes necessitated by the lip-reading.

ADVANCEMENT IN THE TREATMENT OF WOUNDS AND INFECTIONS RESULTING FROM THE WAR[1]

By JOHN H. GIBBON, M.D.

What effect will the experiences of surgeons during the war have on the civil practice of surgery? Has the treatment of wounds been revolutionized? Has any new antiseptic been discovered since the beginning of the war which will prevent or arrest infection? Will experience in the treatment of war wounds change our treatment of wounds in civil practice? What have the men who have been working in military hospitals really learned?

These are the questions which one has constantly put to him by members of the profession and by intelligent and inquiring laymen, and, although the answers cannot always be categorical or perhaps satisfying, yet it has seemed worth while, now that the war has terminated, to take stock of our experiences and to try to estimate of what real value they have been. In doing this I shall endeavor to bear in mind that only a small proportion of my readers are surgeons and yet that all are interested in a general way in this subject. The field is a large one, any portion of which is worthy of high-powered study, but it will be looked upon on this occasion as a whole, and with but a very low lens.

First, it may be said without question that, as a result of this war, the treatment of wounds and infections has been advanced enormously and that this advancement must undoubtedly influence the practice of civil surgery.

Again, it may be said that the man who found himself in a posi-

[1] Read April 2, 1919.

tion to carry out the treatment of wounds in the advanced hospitals, or even in the base hospitals alone, had at least an opportunity to learn a great deal and should benefit greatly from his military experience.

The men who served their country without being fortunate enough to do so in the field of their particular medical or surgical training and experience, the men who filled executive positions or acted as regimental surgeons, made much more of a sacrifice and deserve much more credit than those of us engaged in that line of medicine or surgery in which we were interested before the war and which we expect to follow now that the war is over. It is true then that he who made the greatest sacrifice is the one who will gain the least from a professional point of view, by his experience.

As to the question of new antiseptics, there is not nor will there ever be an antiseptic that can supplant the aseptic treatment of wounds; that is, there is nothing we can use which alone will prevent a contaminated dirty wound, probably containing foreign bodies, from becoming an infected and suppurating wound. The war has definitely taught one great lesson in the prevention of wound infection, it is immediate and complete mechanical cleansing, what the French call débridement, what we might call mechanical antisepsis. It is difficult to find a single term to express just what this means; the word "excision" has been employed a great deal and Crile has made use of the term "revision," but neither, and certainly not the latter, is a comprehensive term. This mechanical cleansing is the most important step in wound treatment and the care with which it is carried out determines the proportion of wounds which may be immediately and completely closed and the proportion of infections and deaths from infections. Time and technic are the factors in the beginning. To close a wound immediately and completely it must be prepared for this closure with care and thoroughness; there must be the certain removal of all foreign materials and of all injured and contaminated tissue. Immediate débridement and complete primary suture without the use of chemical antiseptics constitute the ideal treatment of a gunshot wound, and it is remarkable what results may be accomplished with

care and experience. Before this war no one would have dared in operating upon a gunshot wound to have closed the wound without a drain, and if he had done so there can be little doubt that a serious infection would have followed: and yet this is exactly what was being done in hundreds of cases every day during the last year or two of the war, not because of the employment of any germicidal agent, but through the practice of painstaking removal of everything in the wound which might infect it.

But there must of necessity be a large majority of wounds which cannot be immediately closed; the lapse of sufficient time for infection to occur between the receipt of the wound and the operation, say ten to fifteen hours, varying with the situation and character of the wound, the presence of comminuted bone and the necessity for immediate transportation, all render immediate suture unsafe. In order to render the ideal treatment possible, these wounds must be treated before contamination has produced an infection and the surgeon must be able to keep the patient under his immediate observation for at least two weeks. It is apparent then that it is during the so-called "quiet periods" that the best work can be accomplished; but even during the times of the greatest activity, with sufficient surgical teams, thorough débridement or mechanical cleansing can be accomplished and the closure of the wound may be done later when the patient has reached a hospital where he can remain until healing is complete.

One of the difficult things to give up was partial closure of wounds with the introduction of some form of drainage. Partial closure is an error, however, because it is much easier to sterilize and close a wound secondarily which has been left wide open than one which is partially closed with a drain. Hundreds of wounds were closed by what is called "retarded primary suture" within three or four days at a base hospital after an early débridement done nearer the front. Before this war, sterilization and closure of a large suppurating wound was rarely thought of and still more rarely practised, and yet this was the object of all treatment at the close of the war; and, moreover, it was accomplished in the large majority of cases.

Primarily the credit of successful wound sterilization is due to

Carrel and Dakin, but certainly the surgeons in the American service owe much to Depage, Lemaitre, Duval and others who have elaborated or simplified the technic.

Here, again, just as in the primary operation, the success of the treatment depends upon the care with which it is carried out. Half-hearted effort only results in indifferent success. It was remarkable to see the different results obtained by different men and in different hospitals where exactly the same types of wounds were treated and supposedly the same method of treatment employed.

The most important factor in this sterilization is the thoroughness with which the primary operation is done, for if the surgeon should leave any foreign material, such as a piece of metal or a portion of clothing, or even a portion of devitalized tissue, sterilization becomes difficult or impossible; and the second most important factor is the proper employment of the sterilizing agents. In the American hospitals where the best results were obtained the Carrel-Dakin treatment was employed. If this treatment was properly used, practically any wound free from foreign material was sterilized and closed.

The Carrel-Dakin treatment in infected wounds is one of the big things surgery has gained by the war, and the man who says there is nothing in it, that it is too cumbersome or that there are a number of other methods just as good, has either never seen a hospital where the treatment was being properly used or else he is so hidebound that his opinion is worthless. I am afraid a number of American surgeons had this idea upon their arrival in France, but I am thankful to say that most of them became early converts to the method, and those who did not certainly were never able to produce results comparable to those obtained by the men who perfected themselves in the employment of the method. I never appreciated what this treatment was capable of accomplishing until I saw it properly employed in Carrel's own hospital at Compiègne, and then I was ashamed of my own wards. His wards contained scores of cases with large open wounds in the process of sterilization, and rarely was there a drop of pus to be seen. By adhering

closely to the Carrel and Depage technic I am thankful to say we were able later in a number of our hospitals to duplicate their results.

I am not prepared to say that other agents, such as dichloramin-T, will not sterilize infected wounds, but I do think that there is no method so universally applicable and reliable as the Carrel-Dakin treatment, and this statement is not made on personal experience alone, but also on a fairly wide observation in many American, French and British hospitals.

There are two criteria for judiging the germicidal power of any of these agents—the fall in the bacterial count, as shown in smears and cultures, and the ability to close the wound completely. No method that cannot stand these tests is worthy of consideration. In my opinion the bacteriologist is an absolutely essential factor in retarded primary and secondary closure of wounds, and I say this in spite of the fact that many surgeons became very expert in determining by clinical evidence only what wounds might be safely closed.

In no field of war surgery has the advance been so remarkable as in the treatment of gunshot wounds of joints. These wounds in our own Civil War were always treated by amputation or followed by severe infection, which frequently caused death or necessitated amputation. Up to the beginning of this war any surgeon who operated upon a gunshot wound of the knee-joint, for instance, and closed it without drainage would have rendered himself liable to a malpractice suit; and yet at the end of the war a surgeon who did not close such a wound was open to the criticism of not doing up-to-date surgery. The results warrant the change in practice, for drainage invariably meant infection of a more or less serious nature and infection meant more or less incapacitating ankylosis or even worse. I have seen a straight series of ten gunshot wounds of the knee-joint, with fracture in all but one, treated by four surgeons (Pool, McWilliams, Jopson and Heuer) at Evacuation Hospital No. 1, heal by primary union and the patients leave the hospital with movable joints. And still can anyone doubt that surgery has advanced since and as a result of the war?

That these results can and must be obtained in civil practice is equally patent. Since my return to civil practice I have operated upon a pistol-shot wound of the knee-joint in which one ball perforated the head of the fibula, caused a gutter fracture of the condyle and a comminuted fracture of the patella, and another ball entered through the shaft of the fibula and perforated the head of the tibia. Early débridement was done in this case and the wounds closed without drainage. Primary healing took place and the man left the hospital within a few weeks with considerable motion in his knee-joint. I am sure that without my own military experience behind me, or that of others, this man would today still have discharging sinuses and probably a stiff knee-joint.

Another field in which the advance has only been secondary to that of joint surgery is in the treatment of gunshot wounds and infections of the chest. Nothing so much lowers the mortality rate and the percentage of infections in gunshot wounds of the chest as the early débridement and closure of the pleural cavity in all sucking wounds of the chest. Few of the cases of perforating wound, or small penetrating wound, where there was no sucking of air into the pleural cavity with each respiration, were subjected to operation unless subsequent infection of the hemothorax occurred, and in my experience it was surprising to see how small a proportion of the cases of hemothorax became infected. There was a definite practice in our own service that any wound of the chest that was operated upon should not be drained, but the wound completely closed. It must be admitted that a small percentage of these cases broke down or became infected later.

Probably the greatest improvement in the treatment of infections of the pleura we owe largely to Depage, who suggested and practised the sterilization of the pleural cavity by constant irrigation with Dakin's solution. Many of you are familiar with the findings of the Empyema Commission in our camps in this country, and the reading of these reports should be sufficient to convince any doubter of the efficacy of Dakin's solution as a sterilizing agent. If there is an area in the body in which infection is tenacious it is the pleural cavity. These infected cavities can be readily steril-

ized and the chest wall closed, or allowed to close, with absolute disregard of the cavity itself. Tuffier and Depage have both shown, and hundreds of others have confirmed the observation, that if the cavity is sterile it will remain closed and the lung will expand. This, then, must be our practice in civil life in the treatment of empyema, and when one remembers the prolonged suppuration in these cases and the difficulty of obliterating the cavities by various plastic operations, one must admit that here again we are indebted to military surgery for a great advance.

Gas gangrene early in the war became a formidable enemy and continued so to the end. The gas bacillus was the *bête noir* of the surgeon; it was the cause of more amputations and more deaths than any other organism. Early and complete débridement was the surest means of avoiding the gas infections, but, as this was often impossible, gas gangrene remained prevalent up to the end of the war. Bull's serum was used quite extensively in some of our hospitals, and I believe in some cases it arrested the infection; but in others it had no effect, and in a few the reaction was so severe that it was thought to have hastened an inevitably fatal termination. I cannot speak of its efficiency as a prophylactic agent, though in the latter months of the war I believe it was used quite extensively in the French and British Armies.

An old enemy of the military surgeon, the tetanus bacillus, certainly cut no figure excepting in the early months of the war; that is to say, it was practically wiped out after the use of the prophylactic injections was regularly enforced. I consider it rather remarkable that during the nineteen months spent constantly in surgical work I saw only two cases of tetanus, and neither of these occurred, in the American service. In the early days of the war the French surgeons saw a good many cases of tetanus, but in recent years, with the prophylactic injections in every case of wound, it certainly became the rarest of all infections. One of the two cases I did see occurred in a poor Tommy who was brought into a British clearing station after fourteen days in No Man's Land, and he, of course, did not have the prophylactic injection. This was one of the most pathetic cases that I encountered, and it

illustrates, if illustration is needed, that this has been a war in which, owing to the brutality of our enemy, chivalry and humanity were conspicuously absent. Such a thing as a temporary truce for the removal of the wounded was unheard of. This poor man, to whom I have just referred, in spite of an infected wound of the buttock containing clothing, dragged himself from one shell hole to another for fourteen days, living on the food and water which he found on the dead. The most pathetic feature of his case was the fact that, although the infected wound of his buttock was being well taken care of and the infection well walled off, he succumbed the day after admission in the agony of tetanic convulsions.

Although we cannot say on reviewing our experiences what the great Ambrose Paré said after recounting his achievements that "There is nothing left for posterity to discover," or of ourselves what Job said of his comforters, "No doubt that wisdom will die with you," yet there can be no doubt that surgery has made strides in certain directions, and that at least some good has come out of this great evil from which the world has suffered during the past four and a half years.

SOME MEDICAL IMPRESSIONS OF THE WAR[1]

By GEORGE WILLIAM NORRIS, A.B., M.D.

The impressions received during nineteen months of overseas service, all but two months of it in France, a part of it in the advance sector, zone of the advance and a part of it in base sectors, are so manifold and kaleidoscopic that it is somewhat difficult to evaluate their relative importance. In the following sketchy discourse an attempt will be made to briefly allude to those aspects which appeal more especially to the internist.

I. Trench Fever. This new, specific, definitely established disease of unknown etiology was the greatest discapacitating factor in the British Army. Transmission by the body louse, both by its bite and by its excreta (when inoculated by way of cutaneous scratching), is universally accepted. It was virtually unknown in the A. E. F. except in the experimental volunteers. It is characterized by sudden onset, with chill, weakness, periods of usually intermittent and recurrent pyrexia (103° to 104° F.), and pain in the bones, muscles and fasciæ. In two-thirds of the cases, prodromes in the form of headache and body pains precede the attack from one to ten days. The nocturnal shin pains are so characteristically severe and constant that everyone thinks at first of secondary syphilis. Frontal and postorbital headache is common. A macular eruption much like the rose spots of typhoid fever occurs, on the second day, in about half of the cases. A ward full of trench-fever patients is one of the gloomiest spots on earth, in contradistinction to the cheer which invests the surgical pavilions.

[1] Read April 2, 1919.

Relapses are very common and sequelæ, such as the effort syndrome, frequent.

Experimental investigations have shown that the disease is a specific entity, due to a filtrable virus, which is present especially in the plasma of the blood. The infective agent may also be found in the urine and sputum of trench-fever patients.

Drugs as well as local applications are ineffectual even as palliatives of pain and insomnia. Major J. E. Sweet has had seemingly encouraging, almost brilliant results from a curative standpoint from the intravenous administration of collargol, although the total number of cases thus treated was, owing to the scarcity of the drug small.[1]

II. Trench Foot. This term has been applied to the vasomotor, nervous and trophic disturbances of the feet of soldiers exposed to wet trenches and cold, damp air, especially during physical inactivity, and if tight shoes or puttees are worn. Sometimes the hands, nose and ears are similarly affected.

The lesions vary from numbness and simple swelling to severe pain and tenderness and cyanosis and gangrene. Investigations made by Major J. E. Sweet, Lieut. H. B. Wilmer and myself at No 16 General Hospital B. E. F. disclosed the interesting fact that with the subject in the horizontal posture, blood-pressure was higher in the legs than in the arms. This difference, which ranged between 5 and 25 mm. Hg, disappeared as the case improved and could be used to separate malingerers from cases of real hyperesthesia without demonstrable visible changes. We were also able to relieve pain and hasten cure by the administration of sodium iodide (20 grains t. i. d.). Just how the iodide acts is not known. It was thought that it might be by stimulating the thyroid gland, but the administration of thyroid extract failed to yield similar results. Wassermann tests were not available, but the response to the iodide medication was too universal to be explained by the fact that we had happened upon syphilitic cases.

[1] For fuller information see Trench Fever, Report of American Red Cross Research Committee, Oxford University Press, 1918.

III. Influenza. Influenza apparently differed in no wise from that which occurred in the United States. In fact, some of our worst cases were those which developed the infection on board the overcrowded transports en route to England and France.

At the front last August, before the influenza epidemic appeared, one encountered hundreds of cases of what came to be known as "three-day fever," a curious and very infectious condition which in the Toul sector, for lack apparently of a definite name, was designated as "plufus." This infection, which bore some slight resemblance to dengue, was characterized by sudden onset, with very severe pain in the back, coryza, bronchitis and conjunctivitis. The fever usually ran a three-day course, sometimes terminated by crisis, and was usually followed by prompt convalescence. Bacteriological studies failed to disclose anything unusual or characteristic. Occasionally bronchopneumonia occurred as a complication. Whether this disease was really mild influenza, first manifesting itself in our army, is still unsettled.

Definite influenza appeared later and was especially fatal among those who did not promptly report at sick call but who remained at their post of duty for a day or two while feeling badly.

At ports of debarkation the most harrowing scenes were witnessed when some of the large transports arrived. One transport brought in 500 cases of pneumonia, and it was reported that the "Olympic" alone on one occasion landed 1500 cases of influenza in England, having had many deaths at sea. On another occasion the "Leviathan" brought 1200 cases into Brest, and was reported to have had over 100 corpses on board.

The institution of masking was, however, entirely satisfactory, and ships upon which this procedure was rigidly carried out had practically no influenza.

IV. Traumatic Hemothorax. Wounds of the chest, accompanied as they nearly always were by hemo- or hemopneumothorax presented many points of interest to the internist, who attended them jointly with the surgeon. In some hospitals these cases were sent to special wards on the medical service, the surgeon being called in when needed. Only about two out of ten chest cases

which have reached the evacuation hospital require surgical intervention, for unless infection has occurred, aspiration of the intrapleural blood is generally all that is required. Indeed, a through-and-through gunshot wound of the chest, made by a clean bullet, was, unless it happened to pierce a vital organ or a large vessel, one of the most benign wounds of the war.

The physical signs noted in these cases differ greatly from those encountered in the pleural effusions of civil life. Nearly always the diaphragm is high on the affected side. This produces a tympanitic note at a level above that at which such a sound is normally encountered. Tympany over an injured lung is very common. It may result from (1) free intrapleural air; (2) relaxed lung; (3) high abdominal viscera; (4) gas bacillus infection.

Hemothorax or pulmonary collapse, or both, may occur without penetration of the chest wall. Indeed, these conditions may be contralateral—that is, they may occur on the opposite side to that of the injury. The existence of such a contralateral collapse, while rare, has been definitely established, but it should not be evoked to explain physical signs unless other causes can be eliminated with reasonable certainty.

One of the commonest mistakes made by one who is not familiar with war wounds is that of diagnosticating a pneumonia on the unwounded side. Such a pneumonia is distinctly rare, but the physical signs of consolidation are very commonly present. The bronchial breathing and other signs are usually due to compression of the injured or uninjured lung by a hemothorax or a displaced mediastinum. Sometimes they are due to atelectasis. Fever and leukocytosis may, of course, occur without pneumonia.

Cardiac displacement is one of the most important criteria for judging the location and size of an effusion. Let me emphasize location, for missiles often follow devious courses and the effusion, or the largest effusion, if both sides are involved, may be on the side opposite to that of the wound of entrance. Sudden and marked cardiac displacement, especially if occurring several days after the injury, and if associated with an increase of tympany and dyspnea, points very suggestively to gas bacillus infection. The

sudden appearance of marked jaundice makes one think of hepatic injury, but this symptom may occur without any injury to the liver as a result of gas bacillus hemolysis.

It is often extremely difficult to decide whether the diaphragm has been injured or penetrated. Abdominal rigidity and pain, with nausea and even vomiting, are all symptoms which may occur from chest wounds if the diaphragm is irritated, in the entire absence of peritoneal infection or injury.

If the hemothorax is large it is well to aspirate as much blood as possible after two or three days have elapsed from the time of injury. The needling should, however, be done high up and in the anterior axillary or even midclavicular line. If the usual posterior site, at the scapular angle, is chosen a dry tap almost invariably results. This is due to the fact that the thick, fibrinous, corpuscle enmeshing portion of the blood accumulates behind; while the thin, serous, dark red, fluid portion is nearly always found anteriorly.

V. Gas Poisoning. Although many different gases were used either singly or in combination the vast majority of cases met with belonged to one of two types:

(*a*) *Suffocative:* chlorin, phosgen, diphosgen, oxychlorcarbon.

(*b*) *Vesicating :* dichlorethylsulfide, dichlormethyl-ether.

The most commonly used were diphosgen and dichlorethyl-sulfide ("mustard gas").

A field hospital full of freshly and badly gassed men is, in the estimation of all who have had an opportunity of seeing it, the most horrible and ghastly sight of the war. Even the man who has received multiple and severe wounds, when he has been splinted, put to bed, and given his morphin, is relatively comfortable; but to see a hundred or more men, hale and hearty a few hours before, slowly strangling to death from pulmonary edema, with gradually increasing dyspnea, cyanosis and pallor, making futile efforts to expectorate and to assist their breathing by volitional effort and muscular contortions, until exhausted they pass from semi-delirium into stupor, collapse and death, is a never-to-be-forgotten sight. A sight which makes one clench one's teeth and curse the Hun who started this dastardly infamy.

This is phosgene!

But can nothing be done? Yes! the cyanotic cases are promptly bled one pint, sometimes two. The ward looks like a shambles, because in hurrying from bed to bed, twenty to thirty in a row, the spurting blood has left its trace upon bed and floor and linen. Meanwhile, oxygen is being administered to greedy mouths while hands are loath to loose the bag when their five minutes of respite are over. For never are there enough bags for all, and the precious gas we must not waste, for it has been no small task to bring these great iron tanks up to the front. Opium we dare not use for it checks an oft life-saving cough. But the gray cases, what of them? Lying about with clammy skin, too weak to move or even care. Some venturous spirits say that one should bleed and then transfuse, but most that we should meddle not.

Digitalis intravenously often helps. This with timely bleeding has snatched many a man from the jaws of death. No one who has seen these measures tried doubts the therapeutic efficacy of phlebotomy.

But let us shift the scene. We are now in a base hospital, sixty miles from the front. At midnight we are to receive a convoy of 400 men who were gassed thirty-six hours earlier. Men who lay in an evacuation hospital for only a few hours and were sent down to us because a "big show" was staged, and since they seemed only moderately gassed, there was no room for them near the front. The train arrives at 3 A.M. The station party—hospital corps men —who for three hours have been trying to keep from freezing by pacing the station platform, help unload the train; and now ambulances in monotonous succession roll up to the receiving ward, unload and return for more. But what manner of patients are these? Their faces red and blistered, their eyes swollen shut, edematous and weeping pus, with photophobia so intense they shield their closed eyelids from the glare of the acetylene flame which lights our portals. The covering blankets are soiled with pus, blood and respiratory mucosa, coughed up or flowing from the nostrils, for the gas has slowly done its destructive work.

Once in the ward, off come the clothes, and with them often large areas of skin from blistered spots on back, buttocks and

genitalia. Fever is present, with dyspnea, chest pain, mild delirium and incessant cough, which, coming uncontrollable from nigh every bed, drives the night nurse into despair. These patients die a lingering death from bronchopneumonia days or weeks after their gassing. In their terminal delirium they fight their battles o'er; curse the Hun or call to loved ones at home.

This is "mustard gas!"

And what can we do? But little, save to remove the clothes which hold the gas, bathe with soapy water, which takes it up, and attempt to ease with steam inhalations and morphin.

Mustard gas was an extremely efficient weapon. It has but little odor, no immediate irritative properties and it soon paralyzed the sense of smell. Areas over which it has been sprinkled from the bursting shell were dangerous, if not absolutely untenable, for days. Even the continuous wearing of masks did not prevent the body burns. A man might sleep in an infested dug-out for hours without being conscious of gas, and yet on waking be fatally poisoned. Then, too, although the actual mortality rarely exceeded 5 per cent., men were incapacitated for weeks and months. Permanent damage to the eyes was practically unknown and the danger of subsequent tuberculosis greatly overrated. It is more than likely that such gassing is capable of activating a latent or healed tuberculosis, but most of the cases who were gassed sufficiently to produce a demonstrable bronchopneumonia died of that condition. In so far as the respiratory tract is concerned, horses suffered much less than men, but one often saw very pathetic animals being led down the road, with low hanging heads and badly blistered fetlocks and genitalia.

As I look back in my memory I see many such scenes as I have fatuously tried to describe. I see hospital orderlies who have spent the day scrubbing floors, cleaning up orange peels and cigarette refuse, serving meals, washing dishes and wondering what the next inspection will bring forth, only to pass the night in carrying litters, checking men's personal belongings, recording admissions, transporting muddy uniforms to the sterilizer or

removing corpses to the morgue. I see medical officers who have spent their days in operating, dressing wounds, writing histories, auscultating chests, censoring letters and making far too many reports in triplicate, only to spend their nights in receiving new patients and often vainly attempting to comfort the comfortless. In civil life we used to think our hospital services heavy when we had six or eight new cases a day. At No. 16 General Hospital it was no uncommon occurrence for an officer to learn by way of breakfast pleasantry that 80 new cases had been admitted to his service during the night and that papers would have to be prepared for the evacuation by convoy of 40 others during the afternoon. During my ten months' stay at this institution 17,000 cases were admitted and discharged. Nor do I forget the patient toilers in the laboratory, as a result of whose labors pathogenic organisms were identified and great gaping wounds were closed and promptly healed.

As I look back I see in my mind many images in gray, walking the wards at the base hospital, treading through the aisles of a hospital train or wading through the tented mud of the field or mobile hospital near the front. Images which toiled by day or night, regardless of fatigue, discomfort, or the bombing Hun, often with sleep forgotten, and the irritation which goes with exhaustion kept well in the background. Images which I honestly believe did more to encourage self-control, to make home seem near and to make suffering bearable to the sore-tried, though well-nigh always uncomplaining gassed or wounded man, I shall never forget how a certain field hospital, overburdened with 600 patients and with a hopelessly inadequate force of "green" "corps" men, who had never taken a temperature or made a bed, was cleaned, ordered, chastened and transformed in a few days into something like what a hospital should be by the arrival of twenty-four American trained nurses. Nor do I forget that a certain division surgeon against whose protest these women had been sent to the advanced zone, frankly changed his mind, honorably ate his words and departed with his division after having moved Heaven and earth to retain these same nurses as a part of his divisional medical equipment.

And in my recollection I also see the chaplains of the army. "Padres" we learned to call them from the British, and often did, as the term seemed more fitting, for fathers they truly were, as they mingled in the sports and jests, shared the sorrows and the heartaches of the sorely afflicted; too often later, and with heartaches of their own, leading the little burial party to the nearby soldiers' cemetery.

Nor can I forget the fostering care of the British Y. M. C. A., under whose auspices and at whose expense the poor old fathers and mothers from the sleepy villages of England, who had a severely wounded son in the hospitals of France, were brought across the channel, rushed across the land by motor and arrived twelve hours after leaving London, bewildered in a strange country, overwhelmed by unaccustomed sights, but undyingly grateful to see their son and know what care he was receiving.

Now when one asks me as many do: "Was not your experience medically of great value to you?" I wonder if it was? We learned to diagnosticate and treat gassed men and we gained some knowledge regarding traumatic hemothorax, trench feet and trench fever. But little of all this has a postbellum application. We handled disease, especially infectious disease, as in civil life, and we treated psychoneuroses by explanation, suggestion and reëducation. Again—nothing new. Of spirochetal jaundice one saw but little, and that trench nephritis was a new and definite entity one has yet to be convinced. On the other hand, many of the refinements of modern diagnosis and treatment had, by stress of circumstances or for lack of supplies and facilities, to be foregone.

No one, I think, could go through the last twenty months of the war abroad without being profoundly influenced and broadened; but that the internist profited by the acquisition of professional experience and knowledge is, to say the least, doubtful.

PHYSIOLOGICAL EXPERIMENTS ON POISON GASES[1]

By ALFRED N. RICHARDS, M.D.

The purpose of the communication given under the above title was to illustrate the work of physiologists in connection with the problems arising out of gas warfare. The establishments founded by the Allies for the study of gas problems were concerned with the military aspects of gas to a greater degree than with its medical aspects: Consequently of the illustrations chosen, only one had direct medical bearing.

1. In the choice of substances having possibilities as lethal or disabling agents accurate knowledge concerning toxicity was required. For obtaining this knowledge two kinds of experimentation were required, viz.: chamber testing and field testing. In chamber experiments animals were exposed to accurately determined concentrations of gas for definite lengths of time. From data so obtained toxicity curves were constructed from which could be computed the concentration of gas required to produce death or casualty for exposures of various durations. The difficulties connected with establishment of standard experimental conditions were mentioned and the practical importance of such estimations in determining the wise choice of gas weapons was illustrated. The illustrations were drawn from work inaugurated and carried out at the British Experimental Grounds in England, of which Dr. Joseph Barcroft was physiological director.

A brief description of field testing was given. In experiments of this type, animals were exposed to gas as liberated from shells

[1] Read April 2, 1919.

or bombs shot from guns or detonated at rest. In such tests results were obtained which gave information concerning the properties of various gases under field conditions, the most advantageous modes of projection and the proper conditions for utilizing their offensive qualities.

2. A brief account was given of experiments on the value of venesection following exposure to lethal gases of the chlorine-phosgene type. The experiments were begun in the New Haven laboratories, originally under the Bureau of Mines, later taken over by the Chemical Warfare Service, under the leadership of Professors F. P. Underhill and Yandell Henderson and were continued at the British Experimental Field by Capt. Samuel Goldschmidt, U. S. A., and Capt. D. W. Wilson, U. S. A. The results demonstrated clearly that the mortality of gassed animals subjected to bleeding soon after gassing is regularly lessened as compared with untreated controls: The results were accepted by the Medical Committee of the British Chemical Warfare Committee as the basis of recommendations. A brief account was given of the physiological changes in the circulation which follow gassing, based upon the experiments of the above named investigators and upon those of Dr. Barcroft.

3. One of the most urgent questions which arose during the last year of the war was that of protection against "mustard gas." An account was given of the manner in which this question was studied at the Experimental Field of the Chemical Warfare Service of the American Expeditionary Force at Chaumont. Protective pastes and protective fabrics for manufacture of clothing were submitted to tests under field conditions with the result that hope was offered for a valuable degree of protection. The armistice intervened in time to prevent the final testing of this hope at the battle front.

DISCUSSION

Dr. Joseph Sailer: The opportunities in clinical medicine offered by the army base hospitals here and abroad were exceptional in the

matter of the very large numbers of cases of group disease presented to our observation. In this way we were able to test out various methods of diagnosis; as, for example, in empyema, in which we found that the accepted rules of the text-books on physical diagnosis left much to be desired. We also had opportunity to test out various methods of treatment, arriving at some definite conclusions, particularly in the treatment of pneumonia. There was occasion to determine the frequency of certain forms of this infection which disclosed some facts that to me were entirely unfamiliar. The problems presented to me were very different from those presented to Dr. Norris. I had no opportunity to see the acute wound cases so numerous at the front, as we were working far back of the lines at the hospital centers. The serious gas cases that we received were already in a state of bronchopneumonia before reaching us. The cases of chest wounds were numerous, but all had passed the acute stage. A most interesting feature was tracing the course of the bullet and the apparent impossibility that in certain cases it could pass, for instance, through the superior mediastinum, without wounding important structures. Yet we saw such cases with only slight empyema going on to satisfactory convalescence.

At Vichy we used hotels for hospitals, having over eighty in operation. While these were well equipped, they were not ideal for treating cases. In the first place we had a large number of cases scattered throughout many small rooms, making the nursing a difficult matter, because we did not have enough nurses for the different rooms. The patients, therefore, could not be as carefully watched as they otherwise would have been. In the second place the plumbing was inadequate, no through the fault of the architect, but because of the fact that in a building designed to house two or three hundred guests there were sometimes placed a thousand to twelve hundred wounded soldiers. Another feature of the hotel was the labor of climbing stairs. Some of the men most deserving of praise in the American Expeditionary Forces were the stretcher bearers in the hospital centers. The work of these men was terrific. Very often 500, 1000 or 1200 patients would arrive in one day, of whom perhaps 600 would be bed cases. They would be carried from the first to the sixth floor in the different hotels, because not in all Vichy was there a single hotel elevator of sufficient size to take a stretcher with a man upon it. Very often these men would be lugged up stairs and then almost immediately be carried down again to the *x*-ray room for examination or to the operating room. There was some good-natured grumbling, but never any actual complaint on the part of these men, and never in a single instance was there unwillingness to perform duty. On a number of occasions the men fainted from exhaustion while working from five to

twelve or twenty-four hours, yet they never had an opportunity of gaining glory or fame in their work.

One of our difficulties was that we had such a very miscellaneous group of medical men with which to work, and I think it is surprising that we got along so well. This was probably due in part to the fact that all were busy, working all day and night, and it seemed quite the custom in the military transport service to bring the trains of soldiers in between 12 midnight and 6 A.M. It was a considerable problem, when every possible bed was occupied and all hotels crowded, to find places, as we did on one notable occasion, for 1200 men brought in, nearly all desperately wounded or seriously sick. We had a still greater problem later in attempting to isolate different cases—the pneumonia cases from influenza and particularly from the gas cases. One difficulty was that of handling the infectious cases. In one of the hotels we had a severe epidemic of diphtheria, and from 6 to 8 cases a day were taken from this hotel to the isolation ward. By masking everybody in the hotel and taking cultures of everyone at intervals of twelve hours it was possible to reduce the number of infections occurring in this particular hotel in the next four weeks to only 2 cases. This experience showed that by military methods and strict regulation it is quite feasible to handle even serious infections.

Dr. James E. Tally: Reference has been made to the efficacy of prophylaxis in tetanus. I think we can all bear witness to the value of typhoid prophylaxis in our experiences. In fifteen months, serving with the Navy in France, I personally saw but one case of typhoid, and that was a man of fifty-five years in our own hospital who did not take the prophylactic treatment, as it is not required of men of his age. Unfortunately he had typhoid and died of perforation. We had difficulty early in obtaining sufficient shacks, so we were compelled to treat infectious diseases largely in one large shack separated by curtains only. We had almost all the time measles, diphtheria, scarlet fever, mumps and cerebrospinal meningitis in the one shack, but during all the time we never had a case of crossed infection, which speaks well for the nurses and hospital apprentices.

Dr. Clifford B. Farr: Dr. Norris has spoken of the gas cases, particulary of the severe mustard cases. I should like to call attention to the fact that the cases were not always so severe. I had the privilege of seeing with Dr. Norris a group of cases corresponding to his description.

A few days afterward, at another hospital close to the front, I saw some 200 cases brought in; all were slightly gassed with "mustard," but hardly a death occurred in the whole series. At the experimental field,

in addition to the physiological work described by Dr. Richards, we made histological studies of tissues from exposed animals. We also made similar pathological studies of human material sent to us from the gas hospitals. Practically all the cases of mustard-gas poisoning (human) had destructive changes in the larynx, trachea and bronchi; even down to the smallest bronchi the epithelium was entirely destroyed. Infection followed, so that in practically all the cases the lesions of bronchopneumonia were present. An interesting feature of the pathology was that some of the later cases showed regenerated epithelium coming from the mucous glands and spreading out on the surface of the bronchial tubes. This was stratified squamous, not the normal ciliated epithelium. It seems probable that some of the cases that recovered also had destructive changes in the epithelium of the bronchi. What the histological lesions may be in these cases can only be determined later on by autopsies in "cured" gas cases dying from other causes.

Dr. Alfred Stengel: Sometimes those of us who have not been actually in the storm center may be able to appreciate what has been accomplished a little better than those who have actually been doing the things. I have not the knowledge or right to speak about the surgical side of army matters, but some attention to the literature regarding the medical discoveries or contributions to the war convinces me there are three things that stand out as paramount, aside perhaps from the discovery or the confirmation of the earlier Japanese investigations on the etiology of trench jaundice and the contributions of our own men under Colonel Strong on the etiology and clinical history of trench fever. The other things that have impressed me as being distinct and lasting contributions to medicine would be, perhaps, the newer ideas as to the diagnosis of empyema, and as to the treatment, medical and surgical, of empyema and the use of immune serum in the treatment of disease. As to the latter particularly I have wanted to say something because I have had opportunity to confirm some of the work that has been done by those in the navy and army service. My own experience with the use of immune serum began before this war with the treatment of pneumonia. I began some work of my own about three years ago in the way of treating cases of ordinary pneumococcus pneumonia with the injection of immune serum derived from patients just convalescing from pneumonia. The results in my experience were very satisfactory and encouraging, but were not carried very far. Then in the great epidemic of influenzal pneumonia that has just passed over us, some of the men in the army, and particularly, I think, some of the men in the navy, reported the most encouraging results from the use of immune serum in the treatment

of influenzal pneumonia, and along this line my own experience just recently has been confirmative. I have had now some fifteen or more cases in which immune serum was used in influenzal pneumonias. I may say that the pneumonias that I have chosen to treat have always been very serious ones, and the result has been there were but two deaths among these. That contrasts very sharply with my own published statistics of about 50 per cent. mortality among cases otherwise treated. The results in the work of the navy men at Chelsea cut down the mortality from 30 to 40 per cent. to 2 or 3 per cent. It seems to me this is one of the most decidedly encouraging medical discoveries of this war. If the same method can be put upon a basis of usefulness for pneumococcus pneumonia as well as for influenzal pneumonia then we will have acquired something of extraordinary value. I have treated only half a dozen cases of pneumococcus pneumonias in this way. This was several years ago. The treatment was discontinued because the laboratory outfit fell down on the typing of the cases and I was unwilling to treat cases without knowing the type of the pneumococcus infection under consideration. Then the influenza epidemic came along and it was, of course, unimportant to determine matters of type. My results have corresponded with those obtained by the navy men in this country. To what extent this work has been done in Europe I do not know, having seen no reports from abroad. Of course, on the other side, so far as our army is concerned, they have had no influenza comparable in its fearful virulence to the epidemic of last September and October, and perhaps they did not have the need or opportunity to study the question from this standpoint. The work which has been done in regard to empyema and that in regard to the use of immune serum in the treatment of disease, especially of pneumonia, seem to me to be among the practical contributions on the medical side, and perhaps the best that have come out of the war.

Dr. John H. W. Rhein: In the time allotted it will be impossible for me to give any comprehensive view of the neuropsychiatric service in the A. E. F.

Outside of the peripheral nerve palsies, which were really the most serious phase of the neurological problems, the neuropsychiatric service consisted of the management and disposition of the mental cases and a few organic nerve cases, and the war neuroses arising in the armies at the front and the base sectors.

Neuropsychiatrists were stationed at the field hospitals on the front, where in time of peaceful warfare, or, in other words, in quiet sectors, the functional nervous cases arising as the results of raids and the local engagements, which from time to time take place in quiet areas, were

retained for treatment for a week or two, and those cases that could not be at the end of that time restored to duty were evacuated to the special neurological hospital at the base. The mental cases were immediately evacuated to the special psychiatric units in the rear.

During combat, however, it was found necessary to provide neurological hospitals at the front, where the cases of war neuroses could be promptly received and retained for a sufficiently long time to receive adequate rest and treatment.

During an offensive it was impossible to retain the cases in the field hospitals sufficiently long on account of the congestion at this point, though the plan was to retain them here for at least two or three days, at the end of which time a certain percentage of cases, namely, those who were merely exhausted, could be restored to their organizations again.

In the Argonne offensive the neurological hospitals were established for the first time and over 2000 cases were admitted. To this number about 60 per cent. were returned to front line duties at the end of an average of ten days.

This is in contrast to results in the Chateau Thierry offensive, at which time no neurological hospitals had yet been established, the result being that all the cases of war neurosis were evacuated to base hospitals indiscriminately, a certain percentage of them going to the special neurological hospital, Base Hospital No. 117 at La Fouche.

The cases at the front could be looked upon in many instances as examples of potential neuroses and susceptible of developing fixed neuroses if exposed to contagion and suggestion, an opportunity for which arose on the way back in hospital trains, in evacuation hospitals, camp hospitals and general base hospitals.

The beneficial results of the neurological hospitals at the front will be seen when the results at Chateau Thierry are compared with those in the Argonne offensive. In the former offensive there were 200,000 men engaged and about 4000 cases of war neuroses developed, all of whom went to base hospitals.

In the Argonne offensive, where there were over 1,000,000 men engaged, only 2000 cases, or a little more, arrived at the neurological hospital at the front, and of this number only 40 per cent. were sent to the rear.

One interesting feature of this subject is that war neuroses may develop among men who are not predisposed to nervous breakdowns. In fact, 50 per cent. of the cases showed no previous nervous history. The explanation of this is that the experiences at the front are so intense that a normal man may develop in a comparatively short time a state of nervous instability which it would require in civil life months or years to develop.

In the English army hysteria was common among the soldiers, the

anxiety states among the officers. In the American army the anxiety states appeared almost equally among the officers and men, and major hysteria was on the whole less common than in either the French or the English armies. The explanation of this is probably to be found in the fact that the American Army was a picked army of young men on the whole, and that the weak members had been fairly well weeded out by thorough examination in the camp.

Dr. H. A. McKnight: I should like to mention a practical point in reference to surgical cases that have been gassed. I worked in mobile hospitals which were quite near the front and a somewhat large proportion of cases which had been gassed were surgical and needed an anesthetic. Upon the administration of ether these patients became cyanotic and the ether had to be stopped. Upon again giving the ether the same symptoms would appear and we were obliged to discontinue our work. We then decided to give ethyl chloride, which we found worked very well, the cases being carried through an operation of half an hour or an hour, with no alarming symptoms, and after operation they seemed to do as well as with ether. The French were using ethyl chloride extensively.

Dr. S. Solis Cohen: I should like to ask Dr. Stengel if he does not recall the observations made by Dr. William E. Hughes at the Philadelphia Hospital, something like thirty years ago, with Dr. Carter, now of Texas, who was then an intern, on the use of convalescents' sera in pneumonia. Hughes and Carter followed the method of two German physicians, the brothers Klemperer. They treated quite a number of cases at the Philadelphia Hospital, with strikingly good results, and then gave up the method because they had a number of failures. At that time, of course, nothing was known about typing pneumonias, and it is quite possible that the observations are worth repeating with reference to types. Also, the serum of convalescents from scarlatina has been used for many years, both in Europe and America, with excellent results, and many suggestions have been made or attempts instituted for similar procedures in all infections, including even gonorrhea and syphilis and tuberculosis. So that, while the war has demonstrated the value of the method better than it has been demonstrated heretofore, the treatment, of course, is not novel. Its limitations are still to be set.

THE HUMAN MACHINE IN THE FACTORY

By FREDERICK S. LEE, Ph.D., LL.D.

In the year 1913–14 the Marey Institute, the prominent physiological institute of France, conceived a plan for the investigation of the general problem of industrial fatigue. The coming on of the war prevented a realization of the plan. But the coming on of the war did exactly the reverse in England. In 1915 Mr. Lloyd George, who was then Minister of Munitions, appointed the Health of Munition Workers Committee, consisting of scientific men, representatives of industrial plants, and government officials. The Committee took up the investigation of industrial fatigue and allied problems, labored diligently for three years, published valuable reports, and went out of existence in 1918. Its place was taken by the Industrial Fatigue Research Board, under the chairmanship of Professor Sherrington, and further extensive investigations are already being performed.

In 1917, soon after we entered the war, the United States Public Health Service also undertook the investigation of various topics relating to the work of the human machine in the factory, being assisted in an advisory capacity by the Divisional Committee on Industrial Fatigue under the Committee on Labor of the Council of National Defense and the similar Committee of the National Research Council. Our work is still being carried on and we have a very considerable program for its continuance.

What I have here to report consists largely of the results of the work that has thus been done in England and in America during the war.

[1] Read May 7, 1919.

It has been believed by both the English and the American investigators that in a properly conducted study of this kind only exact scientific methods should be employed, and accordingly the endeavor has been made to secure, so far as possible, results in terms of quantitative measurements. A number of technical physiological methods have been used for the detection of fatigue and for other purposes, but since most of these methods have been found to be of limited and uncertain use, I will mention only three. These are: The spring-balance method of determining muscular strength, the vascular skin reaction test, and the cinematographic method.

The spring-balance method was devised by Professor E. G. Martin for the determination of the strength of muscles partially paralyzed in poliomyelitis and the gradual restoration of their power. It consists in measuring in pounds the force that is required to overcome the contraction of certain selected groups of muscles and computing from the figures thus obtained the total strength of the body. The test affords a valuable index of bodily condition. By this method it has been found, for example, that the strength of the individual often diminishes during the working day, particularly in the more severe operations and with the weaker workers. It has been found, too, that the different operations in the factory require different standards of strength. Thus the standard strength in the operation of "rivet dipping" is 4870 pounds, in "coal passing" 4230 pounds, in "powder loading" 3700 pounds. The strength shown by women is markedly less than that shown by men. By means of the test, workers can be classified, and the economic disadvantage can be avoided of assigning the strong worker to the weak job, and *vice versa*.

The vascular skin reaction test was devised by Professor A. H. Ryan. By means of a suitable apparatus a stroke is made across the skin of the forearm. This causes, after a few seconds, a white dermographic streak to appear, which increases in intensity and then gradually fades away. The time that elapses between the making of the stroke and the termination of the maximum whiteness of the streak is shorter in fatigue. An index of fatigue is

thus obtained, and a diurnal curve of fatigue may be plotted. This shows, for a working person, a fall during the forenoon, a cessation of the fall or even a slight rise during the luncheon period, and a further fall during the afternoon. Interpreted in physiological terms the curve reveals the progressive course of fatigue during the two spells of the day's work and the interruption of the fatigue process, or even a partial restoration of working power, during the luncheon period. The degree of fatigue appears to be proportional to the output of the worker. A night's sleep or a Sunday rest restores the working power completely.

The cinematographic method has been used in both France and America to present in graphic form bodily positions and bodily motions. It makes it possible to analyze complicated motions into their components. It indicates the differences between the skilled and the unskilled worker. Amar has combined advantageously the cinematographic method with a method of tambour registration of physiological movements, and has thus demonstrated, among other facts, the greater rhythmicity of the skilled worker's motions.

A method that has been used extensively, both in this country and England, is that of measuring the output of the worker. This can be done very exactly in many factory operations, and only exact measurement, with conditions carefully controlled, is here of value. Studies of output may be profitably supplemented by the technical physiological tests.

The diurnal course of output has been studied extensively by the American observers and is illuminating. It may be represented in a graphic curve, which varies according to the type of work but with each type is fairly constant. In one of our large munition factories, engaged in the manufacture of fuses for explosive shells, where the working day was of ten hours' duration, from 7 A.M. to 6 P.M., with a luncheon rest of one hour, from 12 M. to 1 P.M., diurnal curve of output in a dexterous operation, requiring careful attention and exact neuromuscular coördination, was found to be as follows: Beginning rather high in the morning the curve rose still further and reached its highest point during the second hour

of the forenoon; thence it fell gradually until the luncheon period; beginning at a slightly higher level after luncheon it again rose momentarily, but only slightly, and then fell progressively throughout the rest of the afternoon, reaching its lowest point for the day during the final hour. From such a curve of output certain inferences may be drawn concerning the physiological state of the individual. The preliminary rise of the curve in each spell indicates the physiological effect of practice; the fall of the curve in each spell is indicative in considerable part, although not wholly, of fatigue, which becomes more pronounced as the day proceeds. The higher curve just after, rather than just before, luncheon indicates the restorative influence of rest and food. Constant features of dexterous work as revealed by the curves of different operations are the appearance of the maximum of production during the forenoon spell and the presence of maximum fatigue in the final hour of the afternoon spell; variable features include a variable degree of the practice effect and the fatigue, the appearance of maximum production, not always in the second but often in the third or fourth hour, and a variable degree of the restorative effect of luncheon.

Not all factory operations show an output curve like that of dexterous work. Where the work is of a severely muscular nature there is usually no practice effect whatever, but a marked fall from the beginning of each spell, with a great restoration of working power at the luncheon period. The gradual course of the fall may be interrupted by a momentary spurt toward the end of each spell, but the final minimum is very far below the initial maximum of the day's work.

The pronounced slackening of production that accompanies the day's fatigue and is so common a feature of the diurnal curve inevitably raises the question whether fatigue may not be lessened and the output be maintained more nearly at its maximum as the day proceeds, without at the same time impairing the working power of the worker. This is a question to which much attention has been given by the observers in both England and America. Many devices have been suggested for increasing total output.

The very frequent increase that follows the luncheon period suggests at once the possible value of introducing other rest periods. This has been tested in a considerable variety of operations and with a considerable number of workers. In this country we have introduced experimentally two ten-minute rest periods, one in the forenoon and one in the afternoon, in two factories, an eight-hour and a ten-hour factory. The result in the eight-hour factory was rather indeterminate, but in the ten-hour factory it was very definite. Here in eleven out of the twelve operations studied, the total output of the day was found to be increased. In one particular case a group of workers in an operation was observed for a number of weeks before introducing the rest periods and then for three successive periods afterwards, each period consisting of two or three weeks. In the first of the subsequent periods the total increase in the day's output was 3 per cent.; in the second period it rose to 17 per cent.; and in the third period to 26 per cent. This progressive increase was simply the effect of the introduction of two ten-minute rest periods. This was an extreme case, but is very significant. Whole holidays likewise have a beneficial effect. In one factory the stopping of work on the Fourth of July increased the output subsequently by 2 per cent. It will be remembered that more than a year ago the Fuel Administration caused the factories to shut down for five days. We determined the daily output in one factory before that period and then for a few days afterward, and found an increase of 8 per cent.

This brings us directly to the question of the proper length of the working day, a question which always obtrudes itself into an investigation of this kind. We have made in this country a comparison of the eight-hour and the ten-hour working periods as they exist in two prominent factories, and have combined in two curves of diurnal output the results in all the operations studied. There is one striking difference between them: Production at the eight-hour plant tended to be more uniform throughout the day, whereas with ten hours of work the deviations from the maximum were more pronounced, as to both practice and fatigue effects. It might be added that at the eight-hour factory there were fewer

absences of workers and the workers approximated their physiological capacity more nearly. All these differences attest the greater efficiency of the eight-hour over the ten-hour factory studied. The facts are suggestive as to the comparative efficiencies of the eight-hour and ten-hour systems, although from two factories alone it would be unwise to generalize. In this connection the data found by Dr. Vernon in certain types of operations in British factories are significant. When there was a reduction in weekly hours in a very heavy operation from 58.2 to 51.2 there was an increase in the output of 22 per cent.; in a moderately heavy operation a reduction from 66.2 to 45.6 hours resulted in an increase of 9 per cent.; in a light operation a reduction from 64.9 to 48.1 hours caused a diminution in output of 1 per cent. In the heavy and moderately heavy operations the human being was constantly busy—the physiological element predominated; in the light operation the human being during much of the time watched the machine do the work—the machine element predominated. Thus the living machine works differently from the lifeless machine: With the latter diminishing the hours of labor diminishes output, with the former diminishing the hours of labor, within limits, increases output. Such facts indicate that the problem of the length of the working day has its physiological features; in fact, it seems to me that it is more a physiological than any other kind of problem. More investigation is here desired, but such investigation, I predict, will show that the optimum duration of labor varies with both the nature of the operation and the worker: One length of day is best for certain kinds of work and certain workers, and another is best for other work and other workers. The establishment of a universal working day would therefore be an unscientific procedure. If it were fixed at eight hours, as seems now not improbable, agitation would not stop there. A labor leader said in my hearing in New York several years ago, "When we have secured the eight-hour day we shall begin immediately to work for a day of six hours." American miners are already asking for six hours, and in England Lord Leverhulme is advocating the universal six-hour day. The

problem would be clarified if a clear distinction were always made between the length of the work-day and the length of the pay-day. Many workers, while demanding the shorter day, are entirely willing to work for the longer time if paid relatively higher wages. The recent grant of the eight-hour day to the railway employees of this country consisted merely in establishing a basic pay-day and had nothing to do with the question as to how long railway employees ought to work.

Night work has been investigated in both England and America. Here we have determined the output in certain operations of a factory that maintained a twelve-hour night. The work began at 6.20 in the evening, and continued until 6.40 in the morning with a break of twenty minutes for luncheon at midnight. The course of production during the first spell was fundamentally not unlike that of the first spell of day work, the curve showing a practice rise and then a fall; the rest of twenty minutes with food did not prevent a further fall following luncheon; in the second spell there was at first a practice rise followed by a gradual fall. But the most striking feature of the night curve occurred after 5 A.M.: This was a precipitate and enormous fall. In one operation, where production during most of the hours of the night had amounted to 10,000 and 11,000 pieces hourly, it fell during the final forty minutes to 152 pieces. If the day and night curves of the same operation be compared, the noticeable difference is similar to that between the curves of the eight- and ten-hour plants: Greater uniformity of hourly production during the day, and greater deviation from the maximum during the night.

Other facts which we observed in night work were these: The number of seconds that were required to perform a certain specific operation was determined during the four successive three-hour periods of the night. This time gradually increased as follows: 12, 13.3, 16.5 and 17.4 seconds; that is, there was a progressive slowing of the operation of about 50 per cent. During the early part of the night it is not customary for workers to sleep, but during the final quarter of the night in the same factory we found 43 per cent. of the workers in a group of seventy-four sleeping at

some time. In one factory the night workers were found to be weaker by 500 pounds than the day workers. Whether this was caused by the work, we do not know.

All these facts indicate that night work is not as efficient as day work, and this is supported by the British observations, which show that with approximately equal working periods the output of the night workers was 6 to 17 per cent less than the output of the day workers. Working at night is and must always be in some degree an abnormal occupation for the human being; but apparently it cannot be dispensed with. The problem therefore is how its evils may be mitigated while output is maintained or improved. It seems obvious that the early morning hours after a night of work are relatively unprofitable; that at least the final two hours of a twelve-hour period might be eliminated and the worker be sent home at, say, 5 A.M. and given more time for sleep. It seems not improbable that by such a change the total production of the night could be increased.

A few words may be said about the seasonal course of output, although this topic has not been investigated exhaustively. Vernon found that in the tinplate industry the output of the millmen in five factories varied inversely with the temperature of the outside air. The output in August was 10 per cent. less than in January. High humidities also were accompanied by decreased production. By good ventilation the seasonal variation could be counteracted in considerable degree.

It is well known that the human machine will frequently limit its output voluntarily, in other words, will "soldier." This practice is very common in factories. In one munition factory which we investigated we found it prevalent in more than half of the departments. It is indicated by a constant output day after day or night after night. For instance, one worker on fuses produced at his lathe exactly 1000 pieces every night for 44 out of 45 nights that were ovserved; and each member of a group of sixteen workers drilled 36,000 pieces night after night for a week. If a machine breaks down and is stopped for repairs for a brief time, the work is subsequently speeded up and the worker finishes

his time with his usual figure. There are many reasons why workers limit their output. A very common cause is the custom of the employer to cut the piece rate when earnings seem to him to approach an alarmingly high figure. When this is done repeatedly, as has frequently happened, the employe recognizes that it is not to his advantage to work honestly up to his capacity. What should here be done and what will be done ultimately, I believe, is to develop a spirit of coöperation on the part of the worker and the employer. The worker should be encouraged to labor honestly and approximate his physiological capacity, and should be assured that his diligence will be honestly rewarded. Only thus can efficiency be secured. By physiological capacity, however, I do not mean physiological exhaustion. The avoidance of overfatigue is one of the prime essentials of efficiency.

Another topic which has been studied to some extent in both America and England is that of industrial accidents. Most industrial accidents have a physiological origin; they are due to something that the worker himself does wrongly or fails to do. Of the possible physiological causes it appears fairly conclusive that fatigue is potent. Accidents increase in number during the working spell, the maximum number occurring, however, shortly before work ceases. The investigators of the Public Health Service find that the accident risk, or ratio of accidents to output, is greatest, at least in the ten-hour plant, in the final hour of the day's work, that is, when fatigue is greatest. Speed of work is probably another cause of industrial accidents; as is also the inexperience of the worker. The latter is indicated by a close parallelism in the curves of the number of accidents and the number of inexperienced workers over a series of months.

This brings up another problem that has been studied especially in this country, namely, the labor turnover, or the constant change in the personnel of the working force. In one of our munition factories there was maintained a force of some 11,000 employees. Nine thousand employees left the establishment during the course of six months for reasons unknown to the firm. That is a lamentable condition of things. It has been estimated by Alexander that

the introduction of a new worker costs the company $53.92. Thus a large labor turnover involves the employer in an enormous expense, and is one of the factors opposed to a high degree of efficiency. When once efficient workers have been secured, every effort should be made to retain them. Here again a spirit of mutual coöperation between employers and workers will be found helpful.

The last topic of which I shall speak is the work of women as compared with that of men. The war increased the number of women workers enormously. During my recent visit to England and France I was greatly interested to learn of the variety of work in which women were engaged. This included such diverse and unusual occupations as lathe-working, wheeling heavy barrows, stoking, butchering, tanning, digging and shoveling. It is remarkable how the British and French women rose to the emergency. But, however laudable such work may have been for women in the emergency of the war, the question must necessarily be asked whether it is wise for them to continue to pursue all these varied occupations as a permanency. As the war proceeded Dr. Janet Campbell and her assistants made a physical examination of some 2500 British women workers and found that 42 per cent. of them were suffering from fatigue or ill-health. This indicates that many of the women undertook work for which they were not physically fitted. Previous statistics have shown that between the ages of twenty and fifty-five working women are more subject to illness than are working men, although this is not due to child-bearing alone; and that they are more frequently absent from their work. But there are more profound considerations than these. Just as there are obviously anatomical differences between men and women, I think it must be acknowledged that there are also, although less obviously, physiological and psychological differences, which are not the result of education, but are inherent in sex. The lesser muscular strength of women I have already mentioned. If such fundamental differences exist, the question of women in industry then is not as to their greater or less general efficiency as compared with men, but rather as to what kind of work women are

best fitted for. We must seek to discover the special industrial qualifications of women. It seems to me that it is along this line that the subject of women in industry ought to be studied in the future.

I have thus presented some of the main facts that have been discovered concerning the work of the human machine in the factory. What we are observing here is the rise of what is virtually a new science, a science of industrial physiology. We have established, so far, merely the beginnings of the science, but I think it is bound to grow. I think, moreover, that, as far as the human machine is concerned at least, science ought to be a guiding influence in the organization and administration of industrial enterprises. The progressive manager appreciates the value and bearing of such knowledge as we have already acquired and will, I believe, gradually come to make use of it in his treatment of his workers. You are fully aware how grievously during centuries medicine was under the control of empiricism and tradition, and how at last science has come to its rescue and changed its aspect. Industry is still under the sway of empiricism and tradition. Science has its mission here to perform and its success will be as great. In this work of regeneration America has, I believe, a great opportunity for leadership.

DISCUSSION

Dr. James M. Anders: Surely the scientific contribution and lantern slides shown by Dr. Lee are not only interesting but most instructive. When we think of the working man as a mere machine, the thought naturally occurs to one's mind that that machine must receive a certain kind of attention from the employer in order to keep it in a state of efficiency. Skilled he must be in his special line of work, but the care of the body is but little, if at all, less important from the viewpoint of efficiency. Quite independently of the question of keeping the worker in fit condition, however, the employer cannot afford to lose sight of the fact that he is dealing with a human being who has certain social claims

which must be respected. I think the very fact that employers have in recent times been encouraging scientific investigations such as are carried on by Dr. Lee and others, shows that their interest in the welfare of the worker is increasing. Employers of labor should be encouraged to develop the so-called social conscience. It seems to me that the lessons of the war apply to some of the investigations of Dr. Lee. It was found that men in the service undergoing exertion without preliminary training often developed rapid fatigue and so-called irritable heart. That being true, it seems to me that we have a remedy in physical exercise not only for rapid fatigue, but one that would have greatly reduced the percentage of rejections among drafted men, if it had not been neglected in the past.

Dr. Lee in a previous communication made the significant statement that physical exercise tended to increase a man's resistance to the toxic effects of the fatigue poisons. It is obvious then that physical exercise would make for greater efficiency on the part of the human machine. While many laborers, skilled and unskilled, get sufficient physical exercise during their working hours, the majority do not, although it would be to the economic and financial advantage of the employer to furnish facilities, including the room and sufficient time during the hours of labor, for adequate and appropriate setting-up exercises and various forms of gymnastics.

Colonel John R. Murlin: Dr. Lee spoke of the restorative effect of the lunch period. I wonder what was the effect of different types of lunch upon that restoration; whether, for example, the hot lunch would restore a man's working power more than a cold lunch, and whether a lunch, light or heavy, with meat, etc., would make any difference. The opportunity seems to me not only a splendid one to study the fatigue curve, but the suitability of food for different types of work.

Dr. Lee (closing): The questions raised by Colonel Murlin are of very great importance. We have realized very keenly the need in industry of investigation along these nutritional lines. The efficiency of the human machine in the factory is largely dependent upon adequate and properly balanced diet. The general topic has been touched upon by the British investigators, who have fixed upon a minimum diet of 3000 calories for munition workers, but have made no observations on the correlation of relations and output. In this country no work on the topic has yet been done. No one is more competent to direct such an investigation than Colonel Murlin himself, and I trust that at some future time he may be induced to undertake it. It is capable of yielding a very important contribution to the science of industrial physiology.

RESULTS OF NUTRITIONAL SURVEYS IN U. S. TRAINING CAMPS[1]

By LIEUT.-COL. JOHN R. MURLIN, M.C., U.S.A.

About a year ago I spoke to you on some of the work we had already done in the Division of Food and Nutrition of the United States Army. One of the things we were authorized to do at the very beginning was to study the suitability of the rations as provided by army regulation for the soldier as a working man. The way we went about this was to make nutritional surveys of the camps. The question arose whether the army was really wasting food, as was so commonly reported in the fall of 1917. Some authorities on nutrition felt that the army rations provided entirely too much and was a very grave source of waste. Another factor was the inexperience of the cooks and the entire personnel, to some extent the newness of the camp life and the fact that the food was not altogether suitable. This obviously called for investigation, and at a conference held at the Food Administration rooms on September 20, 1917, a program was presented by the Division of Food and Nutrition of the Surgeon-General's Office. This program was, in brief, to select men experienced in food survey, send them to the camps in rotation, having them select typical messes and make quantitative studies in order to determine the quantity of food needed, the quantity wasted and the suitability of the food selected for the purpose intended. These surveys began about October 1, 1917 and have continued almost to the present time. About the middle of July, 1918, the character of the

[1] Read May 7, 1919.

work changed a great deal, owing to the fact that among the activities of the nutritional survey parties was a considerable amount of constructive work. The camp authorities had the feeling that these constructive suggestions, instruction, etc., which the officers were making were losing their effect largely because of the fact that the parties did not reside in the camp long enough. We received numerous requests from the camp commanders that these nutrition officers be allowed to stay longer in the camps. This led to a general order about July 15th that a "nutrition officer" be stationed in each camp of more than 10,000 men. Meantime officers had been trained and sent to France and assigned to several combatant divisions. In October of last year we had a request from the other side that each division coming to France thereafter should have a nutrition officer assigned. In addition to making these studies they made suggestions regarding the use of food, and on the whole were acting as nutritional physiologists to the entire group of 30,000 men. Obviously, they could not handle the food and could not instruct every mess official in the camp; therefore, they gathered together the mess officers and sergeants and gave them instructions to see that directions were carried out. The work was appreciated to such an extent that those men have been kept over in France, and since the Armistice they have found a lot to do in connection with relief work. Colonel Carlson, of the University of Chicago, is doing unusual relief work for children in many parts of Europe. He has taken a group of about twelve of our nutrition officers and they are now busy with the relief work under Mr. Hoover.

As a result of our studies we now know what a soldier needs in the way of food; also about how much food the soldier eats outside of the mess. We have certain other scientific data which have thrown a good deal of light on the question of the nutrition of the soldier. On the other side there was not so much opportunity for studying these things quantitatively.

The ration in the army does not prescribe how much the soldier shall eat, but it is used as a basis of the money value, how much may be spent for the subsistence of one man for one day. On the

other hand, when the army takes the field and gets all its food from the quartermaster the ration is then issued "in kind." Every man gets the same amount of food a day. When the army went to France, the Government began issuing the garrison ration, but it was found to be not very well proportioned to the needs of the men. That led to some changes, the result of studying the suitability of the ration as used. The garrison ration of our army is much more liberal than any of the rations provided the other armies. In November of last year a new order established a winter and a summer ration for our men in France, the difference being four or five hundred calories. In the winter ration which went into effect on November 1st, our troops received over 5000 calories. This was because of our extravagant American ways and because we did not have time to work out a careful distribution of food. The waste in the field is largely inevitable, and much greater than in the training camp. It was necessary to provide more food than was provided in the British and French rations because our men had always been accustomed to liberal rations. Turning to charts presented on lantern slides, the speaker said that the total number of calories per man per day consumed changes little, as the number of messes studied increases, the average being 3633 calories per man, taking the men in all stages of training—green, well-seasoned and at different types of work. With this average food consumption the average waste is about 7 per cent. This is the consumption from the mess in the first five weeks in camp and includes the period of inoculation prophylaxis, homesickness and the time when men become habituated to the mess. At first they do not like the cooking and do not eat as much as when they become accustomed to camp life. That is one of the factors accounting for the difference in the amount of food. The amount of food wasted is not so great at this period because in these recruit organizations they began with a trained mess personnel. The average recruit is likely to pay a little more attention to the rule that food must not be wasted than the man who has been in camp and learned where he can get the better of the mess sergeant.

With a sufficient number of messes included in the survey we find that the distribution curve is exactly symmetrical. We can infer from this that the actual number of calories per man per day consumed by a particular mess in a particular survey is, within the limits shown, altogether a matter of chance. There is no one factor which is sufficient to account for the amount of food which a man would get in one of these messes. It is obvious from the data presented that if we had a sufficient number of messes in each branch of the service the curve would be of exactly the same character.

There are also shown on the screen curves representing the seasonal variation of the amount of food consumed, the gradual rise in the price of food, and the declining waste. From October to March the amount of food consumed is higher, which is natural to expect. So far as I know this is the first observation on men doing essentially the same kind of work summer and winter, and the first time we have been able to say how much difference there is between summer and winter diet for men doing the same kind of work. The additional requirement is only about 400 calories.

In a study of the canteen an effort was made to determine how much food the soldier gets when he spends his money for refreshment. While the chief value of the canteen is the social element, the soldier gets a supplemental meal in the sugar of the soft drinks, in coffee, etc., and the ice-cream, pie and other dessert furnish very concentrated nutrients.

The chart here exhibited represents only 27 of the 261 canteens studied, and they are arranged to show whether the food consumption at the canteen bears any relationship to the consumption from the mess. One would suppose that if the soldier ate less at mess he would eat more at the canteen, and *vice versa*, but that does not turn out to be the case. The consumption at mess bears no relationship to that of the canteen. The cost which is also shown is about three times as much at the canteen as at the mess. A study of the curve of consumption at the canteen shows that while the amount of food eaten does not, the cost of food there does seem to be a matter of chance. There is no one prevailing cause to throw the latter curve askew.

A study of the food consumption of civilians in different kinds of work shows that the nearest approach to the soldier is the farmer. At Camp McClellan we found that the food consumption at mess was 3800 calories and the average at the canteens 600 calories. A comparison of the number of articles of food consumed in the army mess with the number used in a civilian household showed between 50 and 55 articles in the mess in the training camp, while the number used in civilian families was about 39. When the soldier takes the field the number of articles drops to about 15. The number in the officers' messes shows a much greater variety. The officer, of course, maintains his own mess and employs his own cook.

Another slide shows the result of a few days' instruction on the wastage in camp. There was not in this camp the advantage of a school for bakers and cooks. The Nutritional Survey party took the mess sergeant and cook and gave them instruction for three days, and again made these quantitative studies, with the result of a great reduction in the amount of waste. The highest efficiency was found to be at Camp Devens, in the 303rd Field Artillery. The colonel of the regiment was very severe in discipline and had his organization in very good condition. The Nutritional Survey officer asked if they might be permitted to see if the waste could be still further reduced, and the result was absolutely no waste. Everything taken on the plate had to be eaten and anything not taken on the plate went back to the kitchen. Notwithstanding the rigor of this discipline, the men made very constant and uniform gains in weight, the average gain being 6.6 pounds in five months' training. From this it may be inferred that not only was the training beneficial physically, but that the very strict mess discipline is not inconsistent with good physical results.

Another slide shows the importance of taking account of the acid-base balance of the diet. The acid of fruits and vegetables being basic, they should be used in sufficient amount to balance against meats and cereals. Milk comes in between, having a nearly neutral ash.

I may say, in conclusion, that the work started in food and

nutrition will be continued in the army in two forms. The Army Medical School has already established a laboratory which will take care of the instruction of medical officers in this important matter of food and nutrition. Work in sanitation also will be applied in the camps in the inspection of foods at the mess in order to see that no unwholesome food is used and to ensure a properly balanced diet for the soldier.

DISCUSSION

Dr. Alfred Stengel: What Dr. Murlin has told us regarding the rationing of soldiers is particularly interesting in showing how the natural selection of individuals comes out quite nearly to what strictly scientific studies indicate as desirable. Doubtless future summing up of the experience of those who had to do with the feeding of soldiers and those who had to do with the rationing of whole nationalities will prove the most reliable guide in the question of diet suitable to mankind under various conditions of stress. These feeding experiments on a large scale are obviously rather more likely to give accurate indications than are brief studies made with small groups of men on selected diets. The opportunity for such extensive experimental medicine fortunately does not often come to us, but having come, it is gratifying to know that both in this country and in Europe, the highest authorities were enlisted in the service.

I should like to move that the College extend a vote of thanks to the two speakers who have so generously given us their time to address us this evening.

CARCINOMA OF THE GALL-BLADDER[1]

By JOHN B. DEAVER, M.D.

With Description of Pathology

By STANLEY P. REIMANN, M.D.

Although we can contemplate with justifiable pride the great advances in medical and surgical treatment that have followed the introduction of ether anesthesia and the discovery of the source of infection and the means of combating it, we are in no danger of losing the becoming grace of humility. For daily are we compelled to realize our limitations as we are confronted with that inexorable command "so far and no further shalt thou go." In no field of investigation does this injunction seem to be more insistent and persistent than in the search for the cause and the cure of cancer. Steady and untiring research, a voluminous and often tiresome literature have provided with little more definite knowledge than that a constant persistent irritation of mucous or other skin surfaces often results in tissue changes and cellular proliferation with cancerous degeneration as the final outcome.

In the vast majority of ills to which human flesh is heir there is the beneficent gift of pain to herald approaching danger, but pain in cancer, as we all know, is too often the signal of despair. It is for this reason that recent investigations have been so largely directed to pre-cancerous conditions, thus giving to preventive surgery the same importance that attains to preventive medicine.

Not only have we learned something about the early local changes that precede carcinoma but we have gradually been

[1] Read June 4, 1919.

brought to a realization that in its earliest stages cancer itself is entirely local and accordingly, whatever success has accompanied our efforts in surgical treatment is mainly due to early and radical surgery. The vital importance of this cannot be overestimated.

If cancer provides one of the dark chapters in medical literature, cancer of the gall-bladder may be said to have the unenviable distinction of providing some of the darkest pages in that chapter. Kehr in one hundred personal observations of carcinoma of the gall-bladder saw very few that were amenable to operation, and in forty-nine operations had only one recovery. A cancer of the gall-bladder that can be diagnosed before operation or one that can be recognized (without pathological examination) at the operating table is also one that bears the ominous label "too late."

Statistics differ widely as to the relation of gall-stones in the incidence of carcinoma. In my experience calculi were found in 89 per cent. of carcinoma, while in six consecutive pathologically proved cases within the past five years gall-stones were present in all. But whether the incidence be as high as these figures indicate or whether it be as low as Chandler's experience of only two instances of carcinoma in 315 cases of cholelithiasis, we cannot ignore the possibility, especially as we know that the calculi are not the result of tumor formation since secondary cancers do not produce gall-stones.

Thus gall-stones are an important item in the etiology of carcinoma of the gall-bladder. In line with modern preventive measures it becomes a vital necessity to prevent if possible the formation of gall-stones, or failing this, to avoid the possible consequences which the irritation of their presence may cause and remove not only the gall-stones but the primary source of infection that has given rise to their formation.

A careful observation of the reported cases of carcinoma of the gall-bladder reveals the fact that in the vast majority of instances there has been a history of an apparently harmless type of "gall-bladder dyspepsia." Smithies, in his twenty-three cases has observed this in sixteen, the true nature of the disorder showing itself after an average of nine years, with a "minimum of three

years" and a maximum of thirty-six years' duration; while the period of aggressive symptoms ranged from five weeks to three years. In my experience of 16 cases of carcinoma of the gall-bladder, 6 pathologically proved, the others inoperable or diagnosed at laparotomy, among 1000 operations for gall-stone disease much the same fact appears as to the duration of upper abdominal symptoms, the longest period being twenty years and the shortest two years.

Of course not all of these cases were serious in the early stage, but I venture to say that there certainly was a time at which the character of the trouble was such as to demand serious consideration, if for no other reason, by the very fact of recurrence after suitable medication, which so evidently had failed to attack the primary source of infection. Rosenow's researches with regard to the route of infection from such sources and the special affinity of certain organisms from these primary foci for the gall-bladder and stomach are familiar to all of us. I have no reason to depart from my belief that the most fruitful primary source in all upper abdominal infections is the appendix. The presence of bacteria of more or less virulence in cases of cholecystitis in conjunction with abrasions of the mucous surfaces of the organ involved certainly represents a favorable opportunity for the lodgment of the infective process. Infection of the gall-bladder may also take place in other ways: through the portal circulation from an inflammatory process in the digestive tract, the bacteria being then excreted with the bile and passing into the gall-bladder; or it may ascend through the bile ducts; or it may be carried by the blood; and finally it may be brought about by contiguity from neighboring organs. The purely infectious character of cholecystic disease has been emphasized during the war, during which there seemed to be a notable increase in this disorder especially in Germany. Albu has traced the increase to the greater prevalence of typhoid and diarrheal diseases and also to the war diet with its unusual combination of food taken at a meal, which give rise to catarrhal conditions and retrograde infection of the biliary tract. The frequency with which young people are attacked and the absence

of any familial disposition to the disease are additional evidence of its purely infectious character, and it seems furthermore to be supported by the increased incidence during the war of infective catarrhal jaundice also due to faulty alimentation.

The sequence of infection and possible carcinomatous degeneration is also apparent in pathological studies in the surgery of the gall-bladder. The early changes in cholecystitis consist of enlargement of the villi from congestion and leukocytic infiltration, a condition which may or may not be the precursor of calculous formation. The enlargement later on develops into erosion of the epithelium of the villi or one or more of the villi may develop into papilloma the tendency of which to malignant degeneration is well known. It is true that only rarely does the surgeon have the opportunity of seeing the process in its earliest stage. A few instances have been described, the most recent that has come to my notice is a case reported by Hrushka (pronounced Rushka). In this, there was evidence of chronic inflammation with polymorphous hyperplasia of the epithelium showing a marked tendency to deep growth and invasion by proliferation of the latter, and also by its invasion into the gall-bladder mucosa. The various stages from villous enlargement to malignancy have been well portrayed by McCarty of the Mayo Clinic.

Like malignant disease of other abdominal viscera early carcinoma of the gall-bladder can rarely be diagnosed clinically. The symptoms vary from a mild gastric catarrh to severe cholecystic inflammation. A neoplasm situated within the gall-bladder may remain symptomless and may even perforate the wall and attack the serosa without necessarily arousing suspicion of its grave nature. In the neck of the gall-bladder, of course, a neoplasm is not so apt to remain quiescent; but even here if no calculi are present in the cystic duct and the contents of the gall-bladder are sterile the serious condition may remain unsuspected. The combination, however, is rare. Stones are usually present and are infected and occlusion of the cystic duct from the proliferating tumor leads to severe cholecystitis, but a diagnosis of malignancy is not possible. The patient is rarely cachectic, there is no evidence

of ascites and generally no palpable mass; at the same time laparotomy often reveals inoperable carcinoma of the neck of the gall-bladder. But a review of the history of these cases often reveals the story of a severe attack of gall-stone colic, timely treatment of which might have obviated the unhappy end-result.

The question arises, is it wise to operate every case in which a diagnosis of gall-stones is made, as for example when the disturbance affects a young person not of the so-called cancer age. I would say yes, if the attack recurs. Suppose laparotomy reveals only a mild cholecystitis or small calculus or calculi; it certainly was justifiable even though the case in question may be one of the many that do not develop carcinoma. For while they are on the whole, fortunately, few, we have absolutely no way of foretelling which will and which will not undergo malignant degeneration. There is no use waiting for jaundice or for physical evidence of tumor by percussion or palpation. Percussion in cholelithiasis gives little information; and while a palpable mass may be due to hydrops or to empyema, in both these conditions the neck of the gall-bladder usually is displaced and there is no way of telling whether it contains a stone, stones, or a malignant tumor. Carcinoma may generally be taken for granted if a palpable mass in the gall-bladder region is irregular, that is rough and uneven to the touch; but it must be remembered that thickened omentum often gives the impression of an irregular mass. I believe I am in no way reflecting on the diagnostic value of the *x*-ray in saying that it does not differentiate carcinoma of the gall-bladder from a benign condition of the viscus.

The difficulty of diagnosis is sometimes as great in late as in early cancer. In view of this it is as unwise to abstain from inspection in suspected malignant disease of the gall-bladder as it is in the early cases. Not a few cases that clinically suggested cancer have proved benign. In spite of the high mortality of operation for cancer of the gall-bladder I would give every patient the benefit of the doubt, except in the presence of such unmistakable evidence as enlargement of the liver, a hard irregular mass, jaundice, ascites, cirrhosis, cachexia. I would be happy if but one

case in a hundred prove benign to have saved that one; just as happy, in fact, if by operative interference in one hundred cases of cholecystitis only one or two had been redeemed from the danger of malignancy.

My experience has led me to conclude: That every case of cholecystic inflammation that does not yield to medical treatment within a reasonable time should be given the benefit of operation.

Operation in all cases of gall-bladder infection, whether calculous or non-calculous, should include the removal of the appendix as the probable source of infection and the examination of other upper abdominal viscera for associated disease.

A preoperative diagnosis of carcinoma of the gall-bladder in its early stage is not possible; and in the late stage a mistaken clinical diagnosis may sometimes be made. The early cases should have the benefit of operation in order to remove the menace while it is still local and eradicable; the latter are equally deserving of laparotomy, at least, in the hope of finding a benign instead of a supposedly malignant growth.

Carcinoma of the gall-bladder cannot wait upon diagnosis. It must be treated before it can be diagnosed.

Dr. Stanley P. Reimann: The very important as well as interesting fact about carcinoma of the gall-bladder is its relation to gall-stones. Statistics of various observers in widely different parts say that gall-stones occur in from 65 to 100 per cent. of cases of primary carcinoma of the gall-bladder. The etiological part which cholelithiasis plays in the initiation of carcinoma has been much discussed. It can be definitely accepted that gall-stones play a very important role in bringing about the changes in the mucosa which lead to carcinoma of this organ in many cases. Their effect may be described, for want of more specific knowledge to "irritation," the same irritation which leads directly to carcinoma of the lip, of the tongue and of other parts of the body, But the actual presence of gall-stones is not at all an essential to the development of a primary carcinoma. In the gall-bladder, as in other mucous surface organs, where a chronic inflammation is

prone to occur, fibrosis tends to snare off and otherwise separate, epithelial elements from their normal positions. These epithelial elements, when snared off in such a manner, appear embedded in connective tissue and seem to have lost what in older books is called their basement membrane. At a superficial glance they appear like carcinoma cells. They are there in their abnormal, apparently invasive position, however, not by reason of any inherent growth of themselves, but they are there merely because the inflammatory connective tissue grew around them. There can be no doubt, however, that these cells may, through influences which are even less known than the influences which promote normal growth, and little enough is known of them, become actively growing of themselves. The normal influences which say to them, "So far shall you grow and no further," are unheeded. They invade in all directions and hence become carcinomatous. Or the chronic inflammatory processes will cause a piling up of layer after layer of epithelial cells on the mucus surface, so that growths resembling papillomata occur. Sooner or later these growths take the downward path, invade the subcutaneous tissue, and another type, perhaps, but still a carcinoma, arises.

There is a peculiar fact in the chemistry of the gall-bladder and its contents, which may have more influence than is commonly given it. This is the lipoid change which is so common in chronic and acute gall-bladder disease. We refer especially to cholesterol. Crystalline deposits of this substance occur quite regularly in the submucosa and mucosa of gall-bladders. Several interesting facts have been brought out experimentally with this substance. It has been found, for example, that rubbing cholesterol into an area prepared to receive a tumor transplant in mice, leads to a highly increased percentage of "takes." Feeding cholesterol to animals in which tumors have been transplanted, also leads to an increased number of "takes." The feeding of lanolin, which contains considerable cholesterol, has led to the development of remarkable papillomatous growths in the stomach of rabbits, according to a Japanese observer. Rabbits apparently are prone to such papillomatous conditions in the stomach, but his results, making due allowance for even this, are at least suggestive.

As to the pathological anatomy of the tumor itself, we have studied the last ten specimens, and the following general types have been represented: adenocarcinoma in seven, carcinoma simplex in two and what might be called a "leather bottle" gall-bladder in one. Little need be said about either the adeno-carcinoma or the carcinoma simplex. In the former, the cells arranged themselves around lumena, and presented pictures which approximate, to some extent, the adenocarcinoma of the stomach. In the carcinoma simplex, the epithelial cells occurred in groups and islands, embedded and invading the more or less dense connective tissue. One of the adenocarcinomata showed a large amount of gelatinous material similar to the type met with in the stomach, the rectum, or other intra-abdominal places. It is said that the gall-bladder is a rather common primary site for gelatinous carcinoma of the peritoneum.

The specimen which we have called "leather-bottle" is the most interesting of the series. It was associated with an acute diffuse suppurative inflammation. Sections from numerous parts showed a uniform and rather diffuse infiltration, with large spheroidal cells invading quite dense connective tissue. They are grouped in masses and are quite similar in appearance to squamous epithelium. The process is quite different from the ordinary carcinoma of the gall-bladder, and it resembles very closely the picture presented by the leather-bottle stomach. The contents of this gall-bladder were pussy fluid and gravel.

Ewing mentions a somewhat similar case in which the process was, in his opinion, just beginning; that is, he found flattened warty growths in the mucosa against which gall-stones pressed, and many of these showed active, though slight, growth downward. He expresses the opinion that this gall-bladder would have been diffusely carcinomatous, had it been allowed to remain in the body a short time longer. His diagnosis was early carcinoma of the squamous-cell type. This anaplasia by which cylindrical epithelium is transformed into the squamous type is not at all uncommon as a result of chronic inflammation.

Eight of these cases showed gall-stones. In all, there was

associated an inflammation, chronic interstitial in eight, and chronic interstitial with acute exacerbation in two.

In conclusion, emphasis for clinical benefit is again laid toward the etiological factors which have been mentioned above, chronic inflammation, irritation of gall-stones, and possible but as yet, least important stimulating effect of cholesterol in producing epithelial overgrowth.

DISCUSSION

Dr. Alfred Stengel: The view expressed by Dr. Deaver and Dr. Reimann regarding the symptoms ofgall-stones in relation to gall-bladder carcinoma is the view which has been expressed by all those who have written on the pathology of gall-bladder for a great many years past, and it is the accepted view. I think that I, myself, am on record in printer's ink to that same effect. That biliary calculi and carcinoma of the gall-bladder frequently coincide is undoubtedly true; but I must confess to having some doubt in my own mind as to the correctness of the belief in the frequency of an etiological relationship of stone to carcinoma. It is possible that the simultaneous occurrence of calculi and carcinoma may be explained in other ways and we ought to bear this in mind if we are going to make the possible causal relationship of the stone to the cancer the determining factor in advocating early operative procedures lest the dread result take place. Speaking a little more specifically, if we are disposed to say to every person having pains in the upper part of the abdomen that they probably have gastric or duodenal ulcer, and that they will probably have cancer if they are not operated upon; or to a person presumably with gall-bladder disease that they must have the gall-bladder removed lest a cancer of the gall-bladder result, then I think we are carrying the germ of truth which may be present further than I think we are justified in doing. It is possible to explain the association of carcinoma of the gall-bladder with gall-stones upon other grounds. It is not at all improbable that in many cases stone formation follows the development of the carcinoma. Dr. Deaver has referred to his own statistical evidence of 89 cases of gall-bladder cancer among 1000 cases of gall-bladder disease. If this is an average figure for carcinoma as the result of preceding gall-bladder disease the relationship is evidently not as great as might appear when we look at the question from the other point of view, that in 89 cases of cancer of the gall-bladder, gall-stones have been found in a very large

percentage. In referring to the etiological connection between the gall-bladder disease and gall-bladder cancer Dr. Deaver said that gall-stones are not encountered in secondary gall-bladder cancer. Primary carcinoma of the gall-bladder, like primary carcinoma of the stomach, is a disease which involves the mucous membrane and the walls to a considerable extent. It therefore would give rise to conditions which could conceivably establish the opportunity for the formation of gall-stones. Similar conditions do not occur in the case of secondary cancer nodules which do not necessarily invade the mucous membrane at all. Without wishing to be in entire epposition to the thought expressed by the speakers, that gall-stones probably have much to do with the development of cancer of the gall-bladder, it is possible that in many cases primary cancer of the gall-bladder may be the occasion for the formation of gall-stones and the invasion of the mucous membrane of the gall-bladder would be a condition precedent to the formation of gall-stones; and that any reasoning or mode of treatment based upon the assumption that gall-bladder disease predisposes strongly to the development of cancer would be based upon facts not altogether established. In connection with this matter of cancer following local lesions of mucous membranes may I add that I cannot bring myself to accept the figures published very prominently from one of the important clinics regarding the frequency of carcinoma of the stomach secondary to ulcer of the stomach, because I have seen and failed to be convinced by the microscopic sections and the lantern slides. Many of the cases reported as carcinoma did not impress me as being carcinoma at all. I remember, a number of years ago, Sir William Osler on looking at some of the lantern slides said, "To my old eyes these look like atypical epithelium commonly seen in chronic cases of inflammation of mucous membranes." I had thought the same thing. Dr. Reimann has brought out the fact that these atypical islets of epithelium in a mucous membrane snared off by fibrous tissue may be the starting-point of carcinoma. Doubtless all pathologists will agree with him, but I think that certain surgical pathologists have gone a little further and tabulated as actual carcinoma some of the cases probably in the stage which Dr. Reimann would call the stage of chronic inflammation, with epithelium snared off. It is easy to build up statistics of carcinoma resulting from ulcer of the stomach from that point of view. There is something else to be said from the point of view of the person to be operated on, as to what are his chances of getting carcinoma because he has gall-bladder disease or ulcer of the stomach. We do not want to give him an overestimate of the dread possibilities nor an underestimate. I am inclined to think that the movement is rather in the direction of overestimation.

Dr. Henry K. Pancoast: Dr. Deaver was entirely correct in his statement that a diagnosis of primary gall-bladder carcinoma could not be made by the roentgen ray, or at least differentiated from the gall-bladder disease. There are four ways in which we are able to diagnose gall-bladder disease: (1) Visualization of the gall-bladder, which is regarded as being abnormal; (2) finding gall-stones, which we do in something under 50 per cent.; (3) by the presence of adhesions between the gall-bladder and duodenum or gall-bladder and stomach, which are fairly easily detected; (4) by the effect of gall-bladder disease upon the action of the stomach in causing phenomena which are very similar, although of less degree, to those found in duodenal ulcer, increased peristalsis and motility.

Dr. William M. L. Coplin: The cellular infiltration in and around the glandular structure in the mucosa of a considerable percentage of normal gall-bladders often gives rise to a somewhat confusing picture. I have seen a number of instances in which it was not possible to satisfy oneself that the process was neoplastic. The appearance is just what one would expect to see in an infective process, lymphocytic infiltration of glands, disintegration of normal gland boundaries, creating a histological field in which carcinoma would readily develop, but to say that carcinoma is present at that stage sometimes is exceedingly difficult, and occasionally impossible. I think that often one might fail to make the diagnosis histologically in the early cases; I am sure some of the cases are carcinoma. I recall a photograph, I fancy the same to which Dr. Stengel refers, and I have seen the same in slides in which normal structures in the gall-bladder have undergone an inflammatory process, and in which the epithelium is pushed off rather than snared off, and when the diagnosis, carcinoma, had been made, the snaring off view concerning typical epithelium is open to criticism because it may have been of glandular origin rather than snared from the mucosa. I should like to know whether these glandular structures have any relation to the occurrence of gall-stones; at present no conclusive opinion is immediately obtainable. Wherever chronic irritation of the gall-bladder can be reached the pathological conditions are in favor of neoplastic evolution, and I venture the view that the surgical indication is to remove the tissue or organ obviously in a state which may be termed precancerous if not actually malignant.

Dr. Deaver (closing): I want to correct a misunderstanding by Dr. Stengel regarding the percentage of carcinoma in gall-bladder disease. The percentage of 89 was the percentage in which calculi were found in carcinoma. Personally, I think the percentage of carcinoma in gall-

stone cases is rather small. In more than 2000 gall-stone operations there were comparatively few cases of carcinoma. Erdman has reported six carcinomas in gall-bladder operations in one week. I agree with Dr. Stengel that whether a person with more than one attack of cholecystitis should be operated upon is open to question. I also agree with Dr. Stengel that the percentage of cancer in ulcer is not as large as some of us have been led to believe. I am having the experience of having patients coming to me occasionally with the history of operation for "benign ulcer." In one case, as soon as I put my hand on the abdomen, I recognized the condition. I said to the man, "You had better go to the hospital and let us make a roentgen ray." He died in two weeks. That the ulcer was diagnosed as "benign" is no reflection on the pathologist. I can understand that 100 examinations might be made and yet the carcinoma cell escape detection. While I still believe that carcinoma is not so frequent as is generally believed, in my opinion gall-bladder disease had better be operated on if there is recurrent trouble.

Dr. Stanley P. Reimann (closing): Like Dr. Stengel, I also have seen a number of lantern and microscopic slides in which I failed to find carcinoma in what was supposed to be carcinoma.

A SHIP EPIDEMIC PRESENTING UNUSUAL RESPIRATORY MANIFESTATIONS (INFLUENZA ?)[1]

By H. R. M. LANDIS, M.D.

The small ship epidemic herewith reported is of considerable interest in view of what happened a few months later. In the month of June, 1918, there were admitted to the University Hospital from a British merchant ship twenty-eight men, twenty-seven of whom were British East Indians, the remaining man being white, and the ship's quartermaster.

The story given was that seven days out from Liverpool, and about an equal period of time from Philadelphia, forty of the ship's crew, consisting of 174 men, were consecutively stricken. Of the forty originally effected twelve had entirely recovered by the time the ship reached Philadelphia. At the time of their admission to the hospital they then presented varying grades of illness. Three were practically well, having neither evidence of constitutional disturbance nor abnormal physical signs. Fourteen had varying degrees of fever and cough and the physical signs of bronchitis, which in some instances was diffuse throughout both lungs, in others, limited to the bases and in one or two instances the rales seemed to be limited entirely to one or the other side. In three, in addition to the evidences of diffuse bronchitis, the sputum was so profuse and of such a character as to indicate a purulent type of bronchitis. In eight there were evidences of distinct consolidation, evidently the result of bronchopneumonia, although in four or five of these the consolidation became later distinctly lobar in distribution. I shall speak of this later.

[1] Read June 4, 1919.

It was thus seen that a group of men were almost simultaneously seized with a respiratory infection which exhibited varying degrees of severity. In some it was so trivial that recovery took place in the course of a few days. In others there was the evidence of varying grades of bronchitis, some of them attended with mild symptoms and relatively few physical signs; in others the evidence of more or less severe infection and very marked physical signs, and finally one-quarter of them had the evidence of distinct consolidation in the lungs, attended with very severe symptoms and fatal issue in five of them. I might state in passing that subsequently during the autumn two more ship epidemics, strikingly similar to this one, were seen at the University Hospital. In the light of what we have since learned from the great pandemic of influenza which swept the country in the autumn of 1918 one cannot help wondering whether this was not perhaps a forerunner. With one exception, as already stated, the men under discussion were East Indians. Their ages ranged from thirty-six to eighteen. They were extremely poorly developed physically. They were below the average stature in height and the average weight for the group was only 109 pounds.

Symptoms. The attack apparently began with considerable similarity in all of them. This was characterized by headache, pain in the back and general aching and soreness all over the body. Chilly sensations were noted in a few of them. Shortly afterward cough developed, at first dry and unproductive, but later attended with a considerable amount of sputum, mucopurulent in character, and in three instances profuse enough to be considered a bronchorrhea. On their admission to the hospital those who were still ill complained so bitterly of pain in the back, throughout the bones and headache as to suggest the possibility of dengue. This, however, was quickly ruled out by reason of the presence of the marked respiratory symptoms and signs. There was also a passing suspicion, in view of their nationality, that it might be a form of bubonic plague. This, however, was not considered very seriously, and examination of the sputum showed no evidence of the Bacillus pestis. It was then felt that it might be a strepto-

coccus infection, such as had occurred in the army cantonments in this country during the previous winter. The bacteriological studies were not satisfactory, as both the hospital staff and the laboratory staff were almost completely decimated by reason of men being in the Service. In two of the cases bacteriological studies from autopsy material showed the presence of large and small diplococci, occurring in chains, which were probably the mucosus.

In those who showed any degree of illness whatever the respiratory rate was usually accelerated, often very markedly so, and was characterized by extreme variations, being at times very high and others relatively low. The temperature curve was irregular, showing very marked remissions even in those with definite signs of consolidation. The pulse-rate was not increased in the same proportion as the temperature. The blood-pressure was surprisingly low. The highest systolic pressure noted in the 24 of the 28 was 105; the lowest, 75. The average systolic blood-pressure for the 24 was 92. The diastolic pressure was correspondingly low, the highest being 80, 4 of them showing diastolic pressures as low as 40. The pulse-rate with the exception of 5, who were severely ill, was slow. During the convalescent stage the pulse-rate tended to fall still lower; 22 of the 24 in whom the leukocyte count was made showed a leukocytosis usually from 10,000 to 12,000. In two instances the leukocytes numbered 23,800 and 19,000 respectively. One of these cases ended fatally and the other recovered.

Physical Signs. As already stated the physical findings varied considerably. In two at the time of admission the evidences of consolidation were distinct. The remaining 6, which were subsequently determined to have pneumonia, showed in the beginning the signs of a very diffuse bilateral bronchitis. These cases are interesting in view of what we learned of bronchopneumonia in the influenza epidemic which occurred later, namely, the evidences of serious constitutional disturbance and the very slight evidences of pulmonary consolidation. As the case progressed, rales having a metallic character and heard over a limited area were usually the first sign of a consolidated process. Later the evidences of

consolidation, in the way of bronchial breathing and dulness on percussion, became more evident.

X-ray Examination. Ten of the cases were examined from one to five times by means of the *x*-rays. In those which gave the physical signs of a diffuse bronchitis with suspicious signs pointing to a possible bronchopneumonia the *x*-ray signs were quite interesting. The following reports are of interest, showing the evolution of the process which for the most part could be checked up with the physical signs:

A. G. June 25. Both lungs contain numerous small spots ranging from a pin-head to a pea in size.

June 26. Spots appear to be larger.

June 28. Spots becoming more confluent, especially at each apex.

July 26. Lungs cleared materially.

V. A. June 25. Diffuse mottlings throughout both lungs, pin-head to pea size. Spots becoming confluent at left base. At right base the mottling is evenly distributed throughout.

June 26. Definite consolidation on the right side in both the upper and lower lobes adjacent to the fissure, which is indicated by thickened pleura.

June 28. A new area has appeared in the fourth interspace in the axillary region on the right side.

July 6. Mottling on left side still present, but may be due to anthracosis. Area in fourth interspace on right side entirely clear.

Morbid Anatomy. There were five deaths. The white man, who presented clinically both from his symptoms and physical signs the evidence of lobar pneumonia, proved at autopsy to be an example of pseudolobar pneumonia. On section the left lower lobe, while uniformly consolidated, showed from the cut surface that the process was in different stages of consolidation, the color of the different areas being brownish red, brownish gray and dirty white. In the upper part of the lobe there was an abscess about the size of a golf-ball. The cut surface of the consolidated lobe instead of being dry and granular, as occurs in true croupous pneumonia, was covered with slimy, pyoid material. There was

also an acute purulent bronchitis. Three other cases also showed definite consolidation involving all or a portion of one lobe. In each instance the cut surface was moist, not granular, and in two of them the cut surface was covered with a sticky, pyoid material. One of these cases showed bronchopneumonic patches in the other lung. In all three instances there was the same evidence of what was apparently a process beginning at a number of different points, later becoming confluent and involving all or a portion of one lobe. In the remaining case the diagnosis of abscesses of the lungs was made clinically. In this case there was a single abscess in the left upper lobe. An abscess of a similar size was also present in the lower lobe of the right lung. In this case there were numerous nodules scattered throughout both lungs, which had undergone fibrinous organization. The anatomical diagnosis in this case was "abscesses in the lungs, acute emphysema, lobular fibrosis and acute mucohemorrhagic bronchitis." It is worthy of note that in the case of the four East Indians coming to autopsy the diaphragm was in each instance poorly developed muscularly and showed an advanced degree of hyalin degeneration. In each of these cases the termination was sudden and the result, apparently, of respiratory failure. It is highly probable that the condition of the diaphragm had not a little to do with this mode of death.

Conclusion. As I have already pointed out in the light of subsequent events, it seems hard to escape the belief that this small epidemic was similar to the great pandemic which appeared in the country later. Certainly the varied clinical picture, the relative frequency of bronchopneumonia and the anatomical character of the pneumonia as seen at the autopsy table are strongly suggestive. It is to be regretted that circumstances did not allow a more thorough bacteriological study. This, however, was unavoidable. It might be argued that the infection under question could not have been similar to that seen in the so-called "influenza epidemic," because in not a single instance was the infection contracted by any of the nurses or doctors in attendance or by others of the hospital inmates. Against this might be urged that the

patients were all confined to one ward, and there was a minimum amount of communication by those in attendance with others in the hospital. Furthermore, being summer time the ward was freely ventilated.

DISCUSSION

Dr. George W. Norris: In France, in the Toul sector, we commenced to have about the last of July what, for lack of a better term, we called three-day fever. It rapidly went through the camps and barracks. The symptoms resembled those in the epidemic which Dr. Landis has spoken of, violent backache, headache, fever, etc., so that some of the regular army officers who saw the cases rather suspected that it might be dengue. Later on the cases developed quite distinct respiratory involvement, bronchitis and an excessive number of rales. Most of the cases reached a crisis in three days, when they promptly got well. Many convalescents were sent back to duty from the field hospitals. A few of the cases, however, developed either lobar or bronchopneumonia. So far as I understand the bacteriological studies failed to show anything very definite. The influenza bacillus was not noted. We have all wondered whether the disease was the same, from which Philadelphia suffered or something entirely separate and distinct.

Dr. Henry K. Pancoast: Roentgen-ray examinations of these cases started the day after their admission. The first two or three examined showed apparently unmistakable evidence of bronchopneumonia, and very much the same appearance as that found during the recent influenza epidemic. When visiting the mortuary a day or two later I saw some lungs full of coal dust and at once realized that some of the mottling taken for pneumonia had been pneumoconiosis and not bronchopneumonia. It had not occurred to us before that the men were stokers and would have evidence of pneumoconiosis. Those who had been stokers for only the first trip would not present evidences of pneumoconiosis. The appearance of pneumonia in most cases were very much the same as those found last October and November that had gone on to consolidation. The mottling in some areas of the lung was becoming conglomerate exactly as was observed then. There is no proof, however, that the condition was the same. Unfortunately, we were afraid to handle the very sick men, and extended studies were not made, either fluoroscopically or with plates. So far as I can recall there were no pleural complications in any of the patients on the ship; whereas, in the influenza epidemic these were quite frequent.

BRACHIAL BIRTH PALSY: A PSEUDOPARALYSIS OF SHOULDER-JOINT ORIGIN[1]

By T. TURNER THOMAS, M.D.

General Considerations.

In 1907 in an adult case of traumatic brachial paralysis with ankylosis of the shoulder-joint following an injury about a year and a half before, breaking up of the ankylosis under ether and the use of forced exercises by the patient resulted in about three months in the return of normal power to the whole limb which has remained unimpaired since. This has been followed by many similar cases of varying grades of severity, in most of which forced exercises without a preliminary breaking up of the ankylosis under ether sufficed to restore the normal motion to the shoulder and power to the limb. The treatment was so simple and the paralysis usually so fleeting that records were kept of only a small number of special cases. In 1909, in a more severe type of traumatic brachial paralysis, with flail shoulder-joint in an adult, transferred to me at the Philadelphia General Hospital from the service of Dr. J. Chalmers Da Costa, by operation the normal shoulder-joint firmness was restored and by forced exercises the operative stiffness or ankylosis afterward removed. In about four months the patient had a normal arm and has had it since. I have now had 18 similar cases; 12 have been operated on. In 9 the paralysis disappeared and in 2 more it is disappearing. In one case death from lung involvement occurred too early to permit recovery from the paralysis. In 1910, in a boy, aged seven and a half years, with a brachial birth palsy, I found a hitherto undis-

[1] Read October 1, 1919.

covered posterior shoulder subluxation of the same side. A complete paralysis at birth had practically disappeared, a considerable wrist-drop remaining, but the limb was much shortened and crippled from the persistence of the old shoulder-joint displacement. Operative reduction of the dislocation was not completely successful, but the wrist-drop was much improved as well as the function of the whole limb. This was the first time this operation had been done for this condition, but it has already become the prevailing operative treatment for it. I have now had 44 cases of brachial birth palsy and am satisfied that these as well as the above adult cases have been pseudopalsies, due to inclusion of the brachial nerves in an axillary inflammation, consequent upon an injured shoulder-joint and not true paralyses from injuries of the brachial plexus. Those interested will find a summarized discussion of this whole subject with the associated literature in the *Journal of the American Medical Association*, 1914, ii, 1018. It is not intended here to infer that the paralysis is not real and extensive and that the nerves are not involved, but merely that the paralysis is a pseudoparalysis in the sense that it is only temporary in the great majority of cases. An explanation of the temporary nerve involvement is offered, but even this is not insisted on. It is merely supported until somebody else offers a better explanation. What is insisted on, however, is that the primary and essential cause of the trouble in most cases is in the shoulder-joint, and that when that is removed early enough we need not be much concerned about the paralysis. That will then take care of itself. What we need most in the obstetrical cases is skilful attention to the shoulder at birth by the accoucheur, but we are probably a long way from this now.

It is manifestly impossible for this new and radical view to make headway without controversy against the universally accepted contrary theory, that of injury to the brachial plexus. The recent work of J. J. Thomas and J. W. Sever, in support of the plexus theory, directly challenges the shoulder-joint origin. They published the results of their work in three papers, all covering essentially the same ground, to which I shall refer when neces-

sary, for the sake of brevity, as the orthopedic,[1] pediatric[2] and neurological[3] papers. The object of their work is seen in the following (pediatric): "Up to within a year or so most of us were reasonably content to accept the theory that the paralysis in these (obstetrical) cases was due to a stretching or tearing of some of the roots of the brachial plexus, due to a forcible separation of the head and shoulders during labor. Other theories have been discussed and have been given some credence, but recently a new one has appeared. It seems that it is about time for us to take account of stock and see which of these various ideas which have been advanced are reasonable and based on pathological findings and clinical facts." Their essential conclusion is as follows: "There is no evidence from our experimental work or clinical observations to support the theories of Lange and T. Turner Thomas that the primary cause of obstetrical paralysis lies in an injury of the capsule of the shoulder or dislocation, with secondary damage to the nerve trunks."[4] They admit that a few cases of shoulder-joint origin may simulate obstetrical paralyses, but claim that these are readily distinguishable.

When it was decided that I would assume the responsibility of opposing the then universally accepted plexus rupture theory and attempt to substitute a shoulder-joint origin, there was no reason to suspect it would soon be necessary to maintain priority for this view. In this connection it now becomes necessary to point out a certain confusion of facts, particularly in the papers signed by Sever alone. I am credited with only one paper, and this is given two dates of publication, 1913 and 1914. Lange's single paper is credited to 1912 and 1913. Notwithstanding these dates, Sever says: "T. T. Thomas has fallen back on the old Lange theory that the injury to the plexus is secondary to an injury to the joint capsule at birth and that the paralysis is due to an exudate which surrounds and compresses the plexus." In the neurological paper, signed by Thomas and Sever, I am credited with six papers and am

[1] Sever: Am. Jour. Orthop. Surg., 1916, xiv, No. 8.
[2] Sever: Am. Jour. Dis. Child., 1916, xii, 541.
[3] Thomas and Sever: Jour. Nerv. and Ment. Dis., 1916, xliv, 289.
[4] Thomas and Sever: Jour. Am. Med. Assn., 1916, i, 206.

here given credit for priority over Lange by two years, my first paper being dated 1910 (it was read in 1910) and Lange's 1912, and yet the following statement appears in this paper: "T. Turner Thomas was, perhaps, the first advocate of this theory in this country." I would state the facts as follows: The first mention in the literature of the shoulder-joint origin of traumatic brachial paralyses in adults and in children at birth and the first suggestion that the basic primary lesion was a laceration of the joint capsule appeared in my paper of the January, 1911, issue of the *Annals of Surgery*, while this is my sixth paper on the subject. Lange's first and only paper on obstetrical paralysis appeared in the latter part of June, 1912.

The few writers who have taken up the Klumpke,[1] lower arm, type of traumatic brachial paralysis in support of the Duchenne-Erb, upper arm, type have added to the difficulties in the solution of an already troublesome problem. There is distinct evidence that most of them have not studied Klumpke's paper. The general tendency has been to avoid this phase of the subject, and with good reason. Madame Klumpke did not report any personal experience with obstetrical paralysis, but referred to two cases reported by Seeligmüller. Her paper was based on one personal adult case of total, flaccid, brachial paralysis of motion and sensation together with a collection of similar cases from the literature. A sharp distinction should be made between this and the Duchenne-Erb type of paralysis. Klumpke saw the difference which must impress anyone who will study the two groups of cases. In the Duchenne-Erb there is essentially no disturbance of sensation, although all cords of the brachial plexus are mixed motor and sensory nerves; the paralysis of motion gradually disappears completely except occasionally for some atrophy and weakness, due to a severe restriction of motion at the shoulder-joint, sometimes at the elbow; and there is a practically constant but varying grade of such joint ankylosis. Klumpke's case was an adult and the cases she collected from the literature like it were adults. Note how the condition she found in her own case differs from that found in

[1] Rev. de méd., 1885, v, 591 and 739.

the Duchenne-Erb type: Sensation is completely and permanently lost except for some variation in its upper limiting border; the paralysis of motion is likewise complete and permanent; and there is no report of ankylosis at the shoulder. The Duchenne-Erb is a temporary or pseudoparalysis, the Klumpke a permanent or true paralysis. Klumpke's chief interest and study was in connection with oculomotor phenomena, particularly inequality of the pupils, and it was because of similar phenomena in Seeligmüller's two cases that she included them with her adult cases. Inequality of the pupils has not been reported often in connection with obstetrical paralysis and not with much positiveness and detail when it has been. I cannot say that it has attracted my attention in any of my cases. I have observed asymmetry of the face but have attributed it to a sympathetic or associated atrophy on the side of the brachial paralysis. I have seen the same side of the chest much atrophied as well as the face.

The fact that in the great majority of obstetrical paralyses the paralysis gradually disappears until it cannot be recognized explains why reports of the condition in adults are so rare. I have never seen such a report, but I have seen two cases of rather a severe grade in adults. One was an orthopedic surgeon who very kindly called on me and gave me the privilege of examining the arm. He had a posterior subluxation of the shoulder-joint, a marked bending downward and forward of the acromion, which was shown well by the roentgen ray, and still had a considerable limitation of movement in this joint. He said the condition had been much more severe in his younger years, but there was at the time I saw him no evidence of paralysis. In addition to the absence of paralysis he furnished another good reason why we do not recognize the condition in adults. He could not afford to permit his present and prospective patients to know that he was crippled and unable to help himself. He added, also, that, so far as he knew, none of his patients or colleagues ever suspected the condition. The second case was a pupil nurse who seemed to have no trouble in performing her duties. She had no paralysis but had some atrophy from the limitation of movement at the shoulder.

Support for the Shoulder-joint Pathology. The temporary or pseudoparalysis, the practically constant preservation of sensation and the practically constant limitation of shoulder movement, which seems to be readily accounted for by the compression of the shoulder by the maternal pelvis during delivery, led me to suggest that the joint injury was primary and the paralysis secondary to it from inclusion of the branches of the brachial plexus in the axillary inflammation consequent upon the joint injury. A non-traumatic inflammation of the joint could produce a similar result. Since I never considered it justifiable to expose the nerves in any of my cases I have been compelled to offer the postmortem and operative evidence of others. Delbet and Cauchoix[1] collected 33 cases from the literature of brachial paralysis in adults following dislocation of the shoulder and added 2 of their own, in which the nerves were exposed at autopsy or operation, usually in the axilla. No rupture was found, but the nerves were embedded in cicatricial tissue, inflammatory tissue or bloody extravasation. Lange[2] exposed the axillary nerves in a case of obstetrical paralysis and found the cause of the paralysis to be the embedding of the nerves in dense connective tissue for an extent of about 4 cm. In 81 cases of obstetrical paralysis in which the brachial plexus was exposed, Wyeth and Sharp[3] found that the "usual lesion was a dense connective-tissue formation choking the plexus and thus impairing its function." Most others who have operated on the plexus in obstetrical paralysis have interpreted these cicatricial conditions as being due to rupture of the brachial plexus. Ashhurst[4] says: "The descriptions of what has been found at operation soon after birth are so vague that not much reliance can be placed on such observations; this vagueness probably is due to the impossibility of telling, even with the nerves exposed to view, how much they were damaged. In cases operated on months or years after the injury occurred the extent of the scar tissue and the difficulty of the dissections render such observations also of limited value."

[1] Rev. de chir., 1910, xxx, 673.
[2] München. med. Wchnschr., June, 1912, No. 26.
[3] Surg., Gynec. and Obst., 1917, xxiv, 34.
[4] Ann. Surg., 1917, lxviii, 25.

Eversmann[1] reported the autopsy findings in a case two and half months after birth. The only lesion discovered was an induration, with thickening at the junction of the fifth and sixth cervical roots of the brachial plexus, for $\frac{1}{2}$ to $\frac{3}{4}$ cm. One could hardly accept these findings as proving a nerve rupture, although they have been widely quoted to prove such an injury.

Stransky[2] quotes Rouland as reporting an autopsy on a case of obstetrical paralysis which died on the tenth day. The nerve findings were negative. It is probable there is not a case of obstetrical paralysis on record in which a frank, recent rupture of any of the cords of the brachial plexus has been found at operation or autopsy. Probably the only case on record with an autopsy soon after birth showing evidence of injury is that of Danyau,[3] who did not find nerve rupture but bloody extravasation around the plexus. He regarded it as evidence of injury of the plexus by forceps, and most of the writers who have since quoted the case agreed with him. Seeligmüller,[4] who was contemporary with Danyau, Duchenne and Erb, and one of the most quoted writers on this subject, thought that the bloody extravasation came from injury of the surrounding tissue by the forceps. He quotes the findings by Fritsch in autopsies on children born by the breech of bloody extravasations under the skin and in the muscles. He believed with Fritsch that such blood could alone cause paralysis by pressure on the nerves, so that with the disappearance of the blood the paralysis would disappear. Fritsch found in one case two days after a difficult delivery of the head a 5 cm. wide hematoma near the lower end of the sternomastoid, the disappearance of which was followed by disappearance of a paralysis of the corresponding arm.

Sever's Capsule Injections and the Duchenne-Erb Theory. The suggestion that the paralysis is due to inclusion of some or all the branches of the brachial plexus in the axillary inflammation consequent upon a shoulder-joint injury is combated by Sever as

[1] Arch. f. Gynec., lxviii, p. 143.
[2] Centralbl. f. d. Grenzgeb. d. Med. u. Chir., 1902, v.
[3] See Duchenne, l'Electrisation, 1872, pp. 353–357.
[4] Berl. klin. Wchnschr., 1874, p. 510.

follows (pediatric): He injected the shoulder-joint of several newborn infant cadavers with methylene-blue and then made an opening in the anterior part of the capsule of the joint to prove that the exudate following a dislocation or sprain of the shoulder-joint would not extend to the brachial plexus above the clavicle. In answer to this I would merely say that if the ecchymosis and exudate from a dislocation of the shoulder-joint, as not infrequently happens, extravasates to the elbow and hand, it will surely go a few inches above the joint to the brachial plexus, particularly in a newborn infant occupying generally the recumbent position. A discussion of the following quotation from Sever could be of very much importance, because it concerns the most vital part of the whole question. "This (the surrounding and invasion of the axillary nerves by the methylene-blue) would in life lead to a paralysis of the whole arm at and below the joint (shoulder), but would in no way affect the nerves above the clavicle, and in no case would there be the typical picture of obstetrical paralysis, *i. e.*, paralysis of the fifth and sixth cervical. As I have stated before, why the exudate should leave the nerves alone in immediate proximity of the capsule and seek out Erb's point, the junction of the fifth and sixth cervical segments, at least two or three inches above the clavicle, Lange and Thomas and others have not made quite clear." The emphasis here should be laid on the fact that Sever accepts without reserve the localization of the lesion at Erb's point. Such unreserved acceptance is very rare in the literature, today, although a few years ago it was almost universal. In a discussion of this subject with an eminent surgical friend in the spring of 1914, he said: "Am I to understand that you do not accept the C V and C VI (Erb) theory!" On my replying in the affirmative he said: "I am amazed! I did not think that anyone doubted that." So far as the literature shows, that was the attitude of probably the whole profession a short time before, but it (Erb theory) has lost a few supporters since.

The amazing thing is that so many writers have accepted and so few have proved it. What is this Duchenne-Erb idea and upon

what kind of evidence does it rest? Duchenne,[1] in four infants a few weeks old, localized the paralysis by *electrical reactions* in every case, without exception, to the deltoid, biceps, brachialis anticus and infraspinatus. This was in 1872. Erb,[2] in 1874, in four adults, localized the paralysis by electrical reactions without exception to the deltoid, brachialis anticus and biceps, usually to the supinator longus and sometimes to the supinator brevis, in one case to the supply of the median in the forearm and hand. In one case of obstetrical paralysis, two months old, he found that "The exact observation, which naturally gave considerable difficulty, showed that the deltoid, biceps, brachialis anticus (probably also the supinator longus), were completely paralyzed and that the infraspinatus was also probably paralyzed." Erb's particular contribution consisted in the fact that he localized the lesion to the junction of the fifth and sixth cervical roots of the plexus. We are confronted at once with the difficulty that the two differed in their localization of the paralysis, but this does not seem to have attracted particular attention. The most characteristic feature of the paralysis is the internal rotation. It is of interest that Duchenne accounted for the internal rotation from the shoulder down and Erb from the elbow down, Duchenne attributing it to paralysis of the infraspinatus and Erb to paralysis of the supinators of the forearm. Obviously the only way by which their work can be corroborated is by finding the same specially localized paralysis in the same way as they did—by *electrical examination*. There can be no substitute for this evidence. To what extent has this been done since the reports of Duchenne and Erb forty-seven and forty-five years ago? A satisfactory answer to this very important question would probably be impossible because of the very extensive literature that has accumulated and the difficulty of avoiding errors in searching it. Thomas and Sever collected the literature since 1902 and referred to that collected by Stransky up to that time, in this way covering the whole ground. All of this literature has been scanned with the purpose of finding cases in

[1] Loc. cit.
[2] Naturhistorisch. medicin. Verein zu Heidelberg, 1874, No. 1, 130.

which the electrical reactions obtained by Duchenne and Erb were confirmed. While one hesitates to give the results because of the possibilities of error and the impossibility of gaining access to some papers, particularly to the theses, a strong suspicion was developed that no matter how careful the investigation very few such cases can be found. Gowers,[1] in 1888, in a clinical lecture referred to a case of obstetrical paralysis examined before the same class a few weeks before in which the electrical reactions characteristic of degeneration had been found in the deltoid, biceps and supinator longus. This is the closest corroboration of Duchenne and Erb that I succeeded in finding, and here there is no mention of the brachialis anticus which was included by Duchenne and Erb. Shoemaker[2] is one of the most quoted supporters of this theory. In the first of his two cases, in the first few days, the right arm hung in internal rotation, motionless except for slight extension and flexion of the fingers. In four to six weeks the power of the other muscles had so improved that a pure Duchenne paralysis had developed which was characterized by involvement of the supra- and infraspinatus, deltoid, biceps and supinators. His interpretation of a "pure" case is evidently open to question. Nor did he make any mention of the use of electricity. Of his second case he said "exact examination shows that the following muscles exhibit delayed development: supra- and infraspinatus, deltoid, biceps, triceps and supinators," surely not a pure case. He quotes Roulland (*Thèse de Paris*, 1887) as reporting a case spontaneously born with a typical Duchenne-Erb palsy (supra- and infraspinatus, deltoid, triceps and brachialis anticus). Here there is no reference to electrical reactions nor to palsy of the biceps, while the supraspinatus and triceps, not mentioned by Duchenne or Erb, are included in the paralysis. Hochsteter,[3] in 1893, reported a case in which "electrical examination by Goldscheider at the end of the third day showed no response of the nerves on both sides, to the constant or indirect current, on the other hand the arm muscles

[1] Lancet, April 14, 1888, p. 709.
[2] Ztschr. f. Geburtshilfe und Gynäk., 1899, xli, 33.
[3] Berl. klin. Wchnschr., 1893, xxx, 1016.

on the paralyzed as on the sound side were brought directly to contraction by both currents." These few cases represent merely a crude effort to turn light on a phase of this discussion that much needs it, and if it results in similar efforts by others it will have served its chief purpose. Unless someone else can do better than this we must assume that the findings of Duchenne in four cases and Erb in one case of obstetrical paralysis represent the only scientific evidence upon which the Duchenne-Erb etiology for this condition is resting today, *i. e.*, the originators of the theory have not been corroborated.

The number of cases reported has increased rapidly in the last few years, but those in which the electrical findings are reported still remain conspicuous by their absence. The failure to find such cases in the literature is strongly corroborated by the following: Fairbanks, in 1913, reported a personal experience of 40 cases, probably the largest up to that time, and supported the brachial plexus theory. He said that electrical examinations are not necessary before the end of the second month, the use of an anesthetic being essential; but by this time the case will probably show definite signs of recovery, so as to render electrical examination unnecessary. Thomas and Sever report a personal experience of 471 cases, by far the largest up to the present, and, perhaps, as large as that of all other writers put together. Sever says of these cases "electrical reactions have not been carried out, for this examination would mean anesthesia, which did not seem justifiable when one already had all the necessary data." We are looking now for corroboration of Duchenne and Erb, and we have here what amounts practically to a confession that it is not obtainable. There is nothing in the articles of Duchenne and Erb to indicate that they found anesthesia necessary for their electrical examinations. Why should it be necessary for ours? Does this not indicate something radically wrong with their method of electrical examination or with ours? Of what value is it to us that Duchenne forty-seven years ago in four cases, and Erb, forty-five years ago in one case, found these electrical reactions if we cannot find them in any of our hundreds of cases today? It seems to me that those

who accept the Duchenne-Erb theory carry a heavier responsibility than those who reject it.

If one may judge from the apparent lack of familiarity of most writers on the subject with the original articles of Duchenne and Erb and the difficulty I experienced in gaining access to them, very few have consulted them. This probably has had something to do with the widespread and unchanging faith that has grown up around them. There has been too much agreement with and dependence on what they found. Sever says that the results of his methylene-blue injections into the shoulder-joint indicated that in life we should have "a paralysis of the whole arm at and below the joint (shoulder)," but that we do have instead a localized paralysis of the Duchenne-Erb type. My experience has led me to the reverse opinion, that we do have the kind of paralysis suggested by Sever's experiments, soon after birth, and do not have the Duchenne-Erb localization, soon after birth or at any other time. I saw 5 cases within eight weeks after birth. One of the 5 had, at six weeks, made a rapid recovery and was moving all parts of the limb, although not normally. Later it made a complete recovery. Dr. L. C. Peter, a neurologist, saw the patient soon after birth and then found a complete paralysis except for slight movements of the fingers. In 1 case seen five days after birth there was not observed a single movement in the whole limb, not the slightest in any of the fingers, but occasionally the child would move the limb as a whole at the shoulder. In the other 4 cases there were very slight movements of the fingers, but of no other part of the limb. These findings are in perfect accord with the results of Sever's experiments.

Erb's Localization. Probably the most striking features of Erb's paper are its positiveness and the dogmatic character of it's clinical findings and conclusions, which allow little else to the reader than to accept or reject them. The result has been so one-sided that one will probably look in vain for any attempt at question concerning them. His localization of the lesion to the junction of the fifth and sixth cervical roots of the brachial plexus is based essentially on his findings by electrical examination in the

four adult cases. His one obstetrical case was evidently employed to show that this special localization discovered by Duchenne in his obstetrical cases was the same as in his (Erb's), adult cases, so that one wonders how the modern supporter of the Erb C V and C VI theory can accept this special localization for the obstetrical cases without accounting for the adult cases in present-day practice. For many years it was accepted for the adult cases, but one looks almost in vain today for any mention in text-books or the literature of this condition in adults. So far as it has been corroborated by electrical examinations in adults it has never had a strong position, according to my investigations. Taylor and Casamajor (*Annals of Surgery*, November, 1913, p. 577) reported 6 adult cases in connection with 4 of which very incomplete electrical reactions were given. They do not corroborate Erb's or Duchenne's findings. Remak[1] in 1877, Hoedemaker[2] in 1878–1879, Bernhardt[3] in 1882 and Nonne[4] in 1887 reported cases in which they found this specially localized paralysis of Erb by electrical examination, but the localization was far from being as precise as in Erb's original paper. It is of some interest to note that Remak was a pupil of Erb, that one of Hoedemaker's 2 cases occurred in the private practice of Erb and that Erb made the electrical examination in Nonne's one case. I found only one other adult case reported in which a similar paralysis was established by electrical examination, but the report was so brief and casual that one hesitates to use it as corroboration. In my opinion Erb's paper is open to at least one serious criticism. He localizes the lesion to the junction of the fifth and sixth cervical roots of the plexus. The fibers to many other than his paralyzed muscles pass through this junction, but he says that "In all four (adult) cases, without exception," the lesion involves the fibers to the same four or five muscles, all the other fibers escaping every time. Now in Case I he accounts for this particularly localized lesion by a traumatic neuritis of the brachial plexus from carrying a heavy load on the head. In Case II, he accounts for the same

[1] Remak: Berl. klin. Wchnschr., 1877, xiv, 116.
[2] Arch. f. Psychiat. u. Nervenkrankh., 1878–9, ix, 738.
[3] Ztschr. f. klin. Med., 1882, iv, 415.
[4] Deut. Arch. f. klin. Med., 1887, xl, 62.

lesion by a "traumatic lesion of a part of the brachial plexus" from a fall down stairs on the outstretched left hand and simultaneously striking with the left shoulder against a wall. In Case III he accounts for it by a "neuritis of a certain portion of the brachial plexus" of unknown cause. In Case IV we are told that a cancerous involvement of the supraclavicular lymph nodes, the patient dying in a few weeks from carcinomatosis, produced pressure on the brachial plexus only at Erb's point. It does not seem to me that such a precise localization of the lesion would be accepted today on such evidence.

Every surgeon knows there is a large number of cases of weakness or palsy of the arm following injury of the shoulder, the pathology of which has never been satisfactorily established. Some see them as paralyses, others only as stiff and painful shoulders of uncertain cause. It is generally understood that dislocations of the shoulder are frequently associated with the severe cases. It is very likely that the Duchenne-Erb type of paralysis resulted from one of the efforts to solve the problem involved. Schulz,[1] in 1908, reported a study of the late results in fifty-four uncomplicated dislocations of the shoulder and found varying grades of brachial palsy in 75 per cent. of them, and in most of the others there was some diminution of strength. He accounted for them by cicatricial contraction of the joint capsule and surrounding tissues. The outstanding fact in connection with these cases is that there was no nerve complication in any at the time of the dislocation. In the July number of *Surgery, Gynecology and Obstetrics* there is an abstract of a paper by Korteweg[2] on "The Results of Dislocation of the Shoulder and its After-treatment." He reviewed 845 cases. The abstract says: "For the diagnosis of a nerve paralysis the author demands the presence of disturbances of sensation and the complete or partial reaction of degeneration." We can only infer that "nerve paralysis" applies here to paralyses due to nerve injury and that Korteweg must have found some that were not in this class. I believe that his diagnostic rule will some day be

[1] Deutsch. Ztschr. f. Chir., 1908, lx, 333.
[2] Zentralbl. f. Chir., No. 46, p. 926.

applied to the obstetrical paralyses by the profession generally and that the Duchenne-Erb theory will fail to withstand the test.

Progress of Shoulder-joint Theory. Attention has already been called to the support which the pathology of a shoulder-joint injury in its etiological relationship to these cases has obtained in the literature. The theory of a shoulder origin has gained

Fig. 1

Fig. 2

Fig. 1.—Duchenne's illustration of his case of obstetrical paralysis with posterior subluxation of the shoulder-joint. The associated paralysis was attributed chiefly to the dislocation which was accounted for by the manipulations of the accoucheur at birth.

Fig. 2.—One of the author's cases with a severe degree of posterior subluxation of the shoulder-joint. The prominence of the humeral head is about as noticeable and there is the same internal rotation of the whole limb and flexion of the elbow, and almost the same prominence of the angle of the scapula, as in Duchenne's case (Fig. 1). The plexus theory supporters, today, say the dislocation is secondary to the paralysis from injury to the plexus.

rapidly in the last few years, and it has had occasional support from the beginning. In his first article (1861) Duchenne attributed obstetrical paralysis chiefly to the associated posterior subluxation which he believed occurred at birth (see Fig. 1). Injury of the brachial plexus also contributed to the paralysis in his opinion.

In his second article (1872) he reported 4 cases without dislocation in which he attributed the paralysis entirely to injury of the plexus. The profession afterward practically ignored the dislocations for many years, and during the last fifteen years, when they have been forced upon the attention of the profession again, the supporters of the plexus theory have accounted for them as a secondary

Fig. 3.—Obstetrical paralysis without dislocation, five days after birth. Not the slightest power in any of the muscles of the limb. Today, there is clearly power in all the muscles and the patient elevates the whole limb forward to the level of the shoulder.

development of the paralysis from the plexus injury. Erb, who reported only 1 case of obstetrical paralysis, thought careful examination would show the dislocations to be few in number. Seeligmüller says that these paralyses in the newborn are frequently complicated by fractures and dislocations and that these complications have been completely overlooked in many cases. He saw

1 case with an undoubted dislocation of the humeral head into the infraspinous fossa. He says that Smellie (who was the first to report obstetrical paralysis in 1768) reported several cases of persisting arm paralysis, due to dislocation intrapartum. Dauchez[1] recognized "obstetrical pseudoparalysis," in which paralysis is simulated by a unilateral or bilateral dislocation of the upper extremity. Küstner,[2] in 1889, attracted much attention by his contention that these obstetrical paralyses were due to injuries of the upper epiphysis of the humerus and the German surgeons who today find the same lesion are probably influenced by his work. The roentgen ray in those cases in which ossification has advanced far enough prove conclusively that the deformity is due to dislocation, not to displacement of a separated epiphysis. B. Sachs[3] said, in 1904: "If many cases were examined soon after birth there might be found a distinct subluxation of the head of the humerus, probably below the deltoid, which might possibly be identified with Erb's palsy; therefore, all cases of obstetrical palsy were not Erb's palsies." Whitman, in a personal communication in 1914, recognized in addition to the common cases with posterior luxations of the shoulder: (1) True congenital luxations of the shoulder (rare); (2) obstetrical luxations at birth usually with paralysis; (3) fractures of the humerus at birth at any point, rarely with displacement of the epiphysis of the head (may or may not be accompanied by paralysis); (4) in a large proportion of the ordinary cases of obstetrical paralysis there are evidences of injury of the shoulder of the nature of strains or sprains, as shown by sensitiveness to movement and pressure. Lange, in 1912, said that most of the obstetrical paralyses were due to lacerations of the capsule of the shoulder-joint. Platt,[4] in 1915, favored the plexus theory for most cases, a primary injury of the shoulder-joint or upper humeral epiphysis for some cases, but treated only the shoulder ankylosis which he found in all cases. Vulpius,[5] in 1914, ascribed these

[1] Ann. de Gynecol., 1891, xxxvi, 300.
[2] Handbuch der Geburtshilfe, p. 301.
[3] Jour. Nerv. and Ment. Dis., 1904, xxxi, 670.
[4] British Med. Jour., May 8, 1915, p. 793.
[5] Deutsch. med. Wchnschr., 1914, xl, 1053.

cases to epiphyseal injuries and found by exact examination that there was no real paralysis or, at least, it was not at all prominent. Gaugele,[1] in 1914, said that most cases were pseudopalsies, due to distortions of the shoulder-joint, with injuries of the capsule and other soft tissues and confined his treatment to the shoulder-joint. Peltesohn,[2] in 1914, said that most obstetrical paralyses are due not to injuries of the brachial plexus, but injuries of the upper humeral epiphysis. Van Neck,[3] in 1912, said that tears of the shoulder capsule and injuries of the upper epiphysis of the humerus simulate obstetrical paralysis. G. G. Davis,[4] in 1916, said that "there is primarily an injury of both nerves and articular structures." He also said: "The restriction of external rotation of the humerus is marked in these infants only a few weeks old," and that "The presence of restriction of movements a few weeks after birth is proof positive of periarthritic lesions." His treatment is confined to the restriction of movement at the shoulder-joint, the elbow-joint and forearm requiring attention in some cases. Ashhurst says: "All the muscles most constantly paralyzed are supplied by nerves which pass very close to the shoulder-joint, and, *ipso facto,* are liable to injury; whereas the muscles which habitually escape paralysis are supplied by nerves which at no part of their course come into close relation with the shoulder-joint or the bones which compose it. This seems to bring us very close to the theory of Thomas and Lange that the primary lesion is in the shoulder-joint and that involvement of the nerves occurs secondarily. It is indeed a question in my own mind whether this is not the most acceptable theory for the majority of cases."

Cadaver Experiments on the Brachial Plexus. In the last analysis the Duchenne-Erb theory must rest upon corroboration and the only kind of corroboration that will avail will be to find in our cases what they found in theirs, the proof of the definitely localized paralysis by electrical examinations. What are the other "necessary data" upon which Sever depended? That resting upon the

[1] Ztschr. f. Orthop. Chir., 1914, xxxiv, 511.
[2] Berl. klin. Wchnschr., 1914, li, 1162.
[3] Jour. de Brux., 1912, xvii, 117.
[4] Internat. Clinics, vol. iii, series 26.

interpretation months or years after birth of the adhesions and nerve thickenings found at operation or autopsy and the experimental data. The operative and postmortem evidence has been disposed of in the discussion of the pathology of the shoulder injury, and I would again refer particularly to the quotation from Ashhurst, with which I fully agree.

The experimental work has played a great part in supporting the Duchenne-Erb view. Fieux,[1] by lateral bending of the neck in the cadaver produced tearing of the roots of the brachial plexus most marked in those arising highest in the neck. He also produced a paralysis of the upper extremity in a rabbit by lateral bending of the neck. Shoemaker, after exposing the brachial plexus, like Fieux, in the cadaver of a newborn, prepared by alcohol, could not produce a tear of the plexus, but accepted the results and conclusions of Fieux for most of his cases. Taylor[2] made twenty dissections on ten infants within three to ten days after death. He found that tension was the only factor concerned in the production of the plexus lesion responsible for Erb's paralysis. By tension he produced a rupture at or about the junction of the fifth and sixth cervical roots of the plexus, in the twenty plexuses, *i. e.*, on both sides of the ten infants. He says "great force must be employed to cause the lesion." Sever's experiments consisted in applying traction and forcible separation of the head and shoulder in "numerous dissections on infantile cadavers." It is a little difficult to determine the results of the force applied, but one obtains the impression from his statements that with forcible separation of the head and shoulders, without lateral bending of the neck, the cords of the plexus could not be ruptured, but were made to "undergo dangerous tension and stand out like violin strings." He goes on to say that: "With the shoulder held and the head carried to one side, with the clavicle intact, considerable force was necessary to injure the plexus," and that "Even with considerable force the fifth and sixth nerves could not be completely torn across at Erb's point but frayed out inside the

[1] Ann. de Gynec., xlvii, 52.
[2] Am. Jour. Med. Sc., October, 1905, p. 675.

sheath, which always gave way first." With the clavicle removed it was easier to injure the plexus, but the clavicle is practically never broken in these cases, so that this experiment does not concern the problem at hand.

It is evident from the preceding experiments that much force is necessary for the production of a tear of the plexus by traction in the cadaver. In looking for a similar force during the delivery of a child we must keep in mind that forceps traction cannot be exerted on the brachial plexus because such traction can occur only after the head is delivered when the forceps are put aside. In most deliveries when the head is out the shoulders soon follow without much traction, often without any. Indeed, one will have no difficulty in finding cases in the literature of obstetrical paralysis developing after spontaneous birth. A case of this kind, reported by Roulland, has been mentioned on a preceding page. Labor was normal in 32 of the 471 cases reported by Thomas and Sever. In view of the results of the above experiments, particularly those of recent years, it is hardly conceivable that the mild lateral bending of the neck necessary for the delivery of an occasional obstructed shoulder will be sufficient to tear the brachial plexus.

I have tried the effect of direct extension on the head and lateral bending of the neck in six bodies of newborn infants, for which the following manipulations and results will be sufficiently representative to answer for all. Placing the body face downward approximately in the L O A position I applied the ordinary forceps (obstetrical) to the head, and while an assistant made counterextension on the shoulders, with my feet braced on the floor I pulled as hard as I could on the forceps—harder, I believe, than any competent physician ever pulled in a successful delivery. This was repeated two or three times. Then placing the right side of the neck on a suitable block of wood, with one hand on the head and the other on the shoulder, I bent the neck over the block with all of my force. This maneuver was repeated twice, after resting between the efforts. I then went through the same procedures on the opposite side of the neck. Dissection of the plexus on both sides

showed no visible rupture at any point in either plexus. With the plexuses dissected clean of all traces of their sheaths the direct traction and the lateral bending on both sides were repeated with the same force as before while watching the plexus of each side in turn for any evidence of rupture, but none was detected. It may be well to bear in mind that as the traction is being applied to the neck and plexuses the continuations of the plexuses, the nerves, are surrounded by loose connective tissue and offer little resistance to the traction. If the dead nerves withstand such traction live ones are more likely to do so.

Treatment. The length of the preceding discussion concerning the etiology is worth while only if it leads to a more simple and effective method of treatment. Efficiency is the order of the day and obsolete ideas and methods are being ruthlessly set aside. One will have difficulty in showing any real progress in the treatment of these cases based upon the pathology of a plexus rupture. Lange spoke of it as the "let alone treatment." The rapidity with which the shoulder-joint treatment has been taken up by the profession since it was based upon a shoulder-joint origin of the condition, indicates that the theory of a brachial plexus origin is being rapidly set aside as surely as the same theory for the adult cases has long been obsolete. While practically all surgeons interested in the condition have adopted the shoulder-joint treatment the acceptance of the shoulder-joint origin has not been so general. Platt, perhaps, best expresses the mental attitude of most surgeons when he says: "As the treatment (of shoulder) is the same for all, the diagnostic disability (as to the seat of the causal lesion) is happily not of great importance." As an indication of the rapidity and completeness with which the shoulder treatment is being recognized this is very satisfactory. But it is not enough because it is not all that the theory of a shoulder-joint origin offers. The shoulder-joint is injured at birth or it is not. If it is injured at birth that is the time to correct the damage, not many years afterward, nor many months or days. If there is no displacement in the joint, complete recovery will probably follow sooner or later, without special treatment; but if there is a displacement, and this is permitted to

"heal in" for a few weeks, the chances are that nothing short of operation will restore the joint to the normal. If the correction is delayed a year the chances are that the normal joint relation cannot be restored even by operation. Sever says that the mere division of the subscapularis tendon is followed by the reduction of the dislocation. Much depends upon what we consider reduction. I have made persistent efforts at reduction in my earlier cases but with little success so far as actual change in the relations of the humerus and acromion are concerned. I am inclined to agree with G. G. Davis, that the good results of the operation are "due not to replacement of the head of the humerus but to the free division of restraining tissues and the placing of the parts in a better position."

We shall not obtain the best results, in my opinion, until we appreciate what went wrong at birth and make our efforts to correct it then. The only way in which this can be demonstrated is by the results in cases so treated. It is probably impossible to determine exactly what happens to the shoulder, but I believe one can obtain a crude but still effective conception of the mechanism of the shoulder injury from a close study of the typical deformity itself. In my judgment only one conceivable cause can account for this deformity, and this will account for every feature of it. The part of the child most liable to damage as it comes through the bony maternal pelvic ring is the widest part, at the shoulders. In rare instances Nature has not provided enough room, and one shoulder, probably the anterior, is jammed out of shape as it is passing under the pubic arch, temporarily or permanently according to the degree of compression. In either case there is a severe brachial paralysis from involvement of the axillary nerves in the consequent axillary inflammation, and the shoulder-joint soon becomes stiffened from the resulting cicatricial contraction. But the inflammation subsides and the cicatricial tissue is absorbed, so that the paralysis gradually disappears, the permanent crippling being due to permanent injury to the shoulder-joint. The elbow suffers often in less degree, but this phase of the subject is left out of the discussion now because it confuses the more important phase.

The shoulder deformity has always been the same in my cases except as to degree. It has three very important characteristics: internal rotation of the humeral head and therefore of the whole limb, mild posterior displacement of the humeral head and bending downward over the head of the acromion antero-externally. The internal rotation is obvious, but the other two characteristics have not received attention until recent years because of their obscurity. They will probably continue to be overlooked in many cases. It may be almost impossible soon after birth to decide the question. There is one pathognomonic sign of the subluxation: On the normal side the upper end of the humerus projects a variable distance in front of the anterior edge of the acromion. On the side of the subluxation it cannot be felt from in front and by careful palpation with the finger the anterior edge of the acromion can be located a considerable distance below its normal level. On the normal side there is a hollow under the posterior border of the acromion; on the affected side, a prominence. The same pressure which forced the head backward bent the acromion down in front of it. It is this bent acromion in front of the humeral head that accounts for the permanency of such a mild subluxation, *i. e.*, permits the head to rest on the posterior glenoid margin without slipping back into the glenoid cavity. It is likely that the cases of obstetrical paralysis without subluxation are those in which the head was not pushed backward enough to allow the acromion to be bent down in front of it. The lesion common to both is the injury to other joint structures, particularly the capsular ligament. I have never seen a permanent palsy or crippling of the limb without a subluxation of the shoulder-joint, except in one in which there was some ankylosis and deformity of the elbow, and in that one the functional disturbance was very slight.

The only treatment that I have followed has been to restore the shoulder-joint to as near the normal as possible. Most physicians know something about the difficulties associated with old unreduced dislocations of the shoulder-joint in adults, so that it will not be necessary to emphasize the difficulty of restoring the shoulder-

joint to the normal in these children in the presence of a long-standing subluxation, with the acromion and humeral head deformed by the original pressure and by later abnormal growth.

We are only beginning to appreciate the importance of this phase of the subject. To repair the damaged shoulder to the best effect is a large problem. My chief ambition is to be permitted to treat a case with dislocation within a day or two after birth. I have had such a case three weeks after birth, but that was too late for my purpose, as the cicatricial or healing process had been practically completed and reduction of the displacement by non-operative methods was impossible. I have seen two cases five days after birth, but there was no dislocation in either. One had a mild grade of paralysis which completely disappeared in a few months. The other had a severe grade of paralysis, but this has been slowly disappearing, fast enough to satisfy the parents, and I still have it under observation. In all probability no case with a dislocation of the shoulder has ever recovered a normal arm, although with shoulder treatment they have been very much improved. According to my experience the improvement is largely in proportion to the degree of improvement obtained in the shoulder-joint. Manifestly the best time to correct the deformity there is when the displacement is recent, *i. e.*, at or very soon after birth. How to obtain the best results at this time is still an unexplored field.

Conclusions. 1. Obstetrical or brachial birth palsy represents only one phase of a much larger shoulder-joint problem. Almost if not all shoulder-joint injuries are associated with a brachial paralysis, palsy or weakness of varying degree and duration. Very rarely will an actual nerve rupture be associated with the paralysis

2. The best evidence of the absence of such a nerve rupture is the almost uniform and gradual disappearance of the paralysis. This is easily proved in connection with the adult cases, and seems to be true of the obstetrical cases, in which the paralysis is usually of longer duration and more difficult to follow up. If the crippling of the limb persists into adult life it will probably be found in all cases that a posterior dislocation of the shoulder is associated, often with some moderate permanent disturbance in the elbow-joint.

3. In obstetrical paralysis soon after birth there is a profound and almost if not complete paralysis of the whole limb and not a paralysis limited to the small Duchenne-Erb group of muscles. This extensive paralysis is best explained by the inclusion of the branches of the brachial plexus in an axillary inflammation consequent upon a birth injury of the shoulder-joint.

4. The extravasation into the axilla of blood and synovial fluid causes an immediate inflammation and later cicatricial tissue, all of which is probably absorbed in time, thus accounting for the disappearance of the paralysis. Such a pathology has been well established by operative and postmortem findings in the obstetrical and adult cases.

5. The Duchenne-Erb localization of the paralysis by electrical reactions to the deltoid, biceps, brachialis anticus (Duchenne and Erb), infraspinatus (Duchenne) and supinators of the forearm (Erb) has been widely accepted but not corroborated.

6. In his first four cases Duchenne found posterior dislocation of the shoulder which he said occurred at birth and was chiefly responsible for the paralysis. He thought, however, that some of the paralysis was due to injury of the brachial plexus. In four later cases he did not find dislocation of the shoulder in any and attributed the paralysis entirely to injury of the brachial plexus. Since then practically nothing has been said of a shoulder-joint origin, the dislocations passing unrecognized, and all cases being attributed to injury of the brachial plexus. Since 1911, when the shoulder-joint injury was offered as the primary cause, this theory has made rapid progress.

7. It is very likely that sufficient traction on the head at birth to rupture the brachial plexus has never been applied in a successful delivery.

DISCUSSION

Dr. Francis X. Dercum: I think that we in Philadelphia have been greatly impressed by the very brilliant results which Dr. Thomas has secured in his cases, and I think we are inclined to agree with him in regarding the nerve involvement which may be present as secondary to the trauma of the joint. I should like to ask at what age he operated on this child?

Dr. Charles W. Burr: Will Dr. Thomas tell us whether, in his opinion, anything should be done with these children at birth; whether anything could be done; or is it better to wait until the child is several months old before operating?

Dr. A. P. C. Ashhurst: My interest in birth injuries of the shoulder dates from the time I first went to the Orthopædic Hospital, over fifteen years ago. Then we used to send all these patients to the neurologists, upon the theory that they were Duchenne-Erb paralyses. I finally asked the neurologists what became of them in adult life, and they said probably all these patients recovered; that they never saw any in adult life; therefore, they concluded they must all have recovered. I then decided to send for some of these patients to come back, that I might see their condition. I then found that the reason they had stayed away was that their parents thought nothing more could be done; and yet they were not cured at all; some had wrist-drop or other paralysis still; and nearly all had considerable persisting disability. This was about the time when Dr. Thomas began his work and aroused renewed interest in the pathogenesis and treatment.

The only advantage of a theory of pathogenesis is that it offers something upon which we can hang our therapeutics. If we accept Dr. Thomas's theory we must change our therapeutics and will no longer have much need for the neurologist in these cases.

I have here, Mr. President, a diagram from Kocher which gives the anatomy of the brachial plexus. Observing the junction of C5 and C6 you will find that people who hold the neurogenous theory (such as the Boston and New York neurologists and orthopedic surgeons) claim that injury at C5 and C6 causes paralysis of the supra- and infraspinatus, the brachialis anticus, the coracobrachialis and generally of the deltoid. Now if you will look at the diagram you will find that fibers which also pass through that point go also to the pectoralis major and teres major and subscapularis and pronator teres; and yet none of these

muscles are paralyzed. By studying the anatomy of the region, this theory should have been given up a long time ago. It is a fact that the muscles that are weak, whether paralyzed or only weak, are the supraspinatus, the infraspinatus, the brachialis anticus, the deltoid and often the extensors of the wrist and fingers. Now from a consideration of the anatomy of the shoulder region, it occurred to me that the nerves to all these muscles which are paralyzed pass close to the shoulder-joint, and that the nerves supplying the muscles not paralyzed do not pass near the shoulder-joint, although they pass through the same trunk (junction of C5 and C6). That brings us close to T. Turner Thomas's theory, since only the nerves near to the shoulder-joint are involved and that the muscles supplied by these nerves are the ones which are weak.

It is surprising that obstetricians and neurologists do not recognize these cases. A number to whom I have spoken have said they never have seen a case, and they have heard with surprise that even a person like myself, for instance, who never claimed to be a specialist in orthopedic surgery, should have had so many of these patients under his care. Obstetricians ought to take more notice of this injury. I have made some notes of what happens in the families of these patients: In one instance three children were severely injured at birth and the fourth child was killed at delivery. After the first one or two injuries the family doctor ought to have wakened up to the fact that these patients were going to have trouble in childbirth. In other instances brothers and sisters have died at birth, and in one case five children were killed at birth by difficulty in labor, only the sixth child, who became my patient, surviving delivery. There is surely room for improvement in the present practice of obstetrics. If the first two are killed why let the others be so born?

And yet it should be realized that the injuries do not all occur in difficult labors. I have had a case in which there was a spontaneous delivery, after easy labor of four hours' duration, with a footling presentation.

Dr. Alfred Gordon: From the practical standpoint there can be no doubt that Dr. Thomas's advice and work are perfectly satisfactory, and I think we all should follow his advice and operate as early as possible. I think Dr. Thomas himself has expressed the opinion that practical therapeutics has benefited considerably from his view. In the matter, however, of pathogenesis I feel that I must part company somewhat with him. In this child, for example, operation was done at the age of three or four months; the child is now three and a half years of age, and all this time has been exercising his arm. How then does Dr. Thomas explain the atrophy of those special muscles. The type of atrophy is

such as we find in typical muscular atrophy, due to disease of the spinal cord and of the nerves. While recognizing Dr. Thomas's excellent work, I do not know whether, from a pathogenetic standpoint, I can fully agree with him in ascribing the disability to dislocation and misuse of muscles. I am inclined to believe there is a real injury of the nerve trunks from the very beginning, and in some cases we find even a lesion of the cells of the spinal cord which sends out those nerves.

One speaker referred to the infrequency of recovery. We find in the literature that Warrington reports 11 cases of complete recovery without operative procedure in a series of 32 cases; another writer, Bruns, 6 out of 11. We see instances of adults in whom in infancy there has been brachial paralysis in which recovery has occurred without operation. Nevertheless, in cases coming under my observation, from a practical standpoint, I would follow Dr. Thomas's advice in the matter of treatment.

Dr. Charles W. Burr: In my own experience I have seen very few spontaneous recoveries from congenital brachial palsies. Probably one reason of this is that at the Orthopædic Hospital the patients whom we see do not come to us in the early months or years after birth. The few cases that I have seen in private practice are cases that have been let alone because it was thought at birth nothing could be done in the way of operation, and they are still as paralyzed as at birth. I have been interested in the question of the time when operation should be done, and in the last few years I have been sending my cases to Dr. Ashhurst. I do not know what he does with them. They are not cured by neurological treatment.

Dr. Thomas (closing): Dr. Burr asked if anything should be done at birth in these cases. All my work and all that I have said on this subject was intended, primarily, to attract attention to the great need of recognizing the shoulder condition at birth and correcting any displacement then. We have no record that this has ever been done; indeed, we have no record that the dislocation has been recognized at birth, although the evidence is rapidly collecting that it is present at that time. Duchenne so interpreted the dislocations in his cases. In most cases the causal force was not severe enough to produce dislocations, and when the joint relations remain normal, full or nearly full recovery of power and movement probably occurs with or without special treatment. In many cases varying grades of permanent distortion of the joint are produced, and this is chiefly responsible for the permanent impairment of function. The only time at which the joint displacement can be corrected is at birth, as anyone can appreciate who knows anything about

the difficulty or impossibility of reducing old dislocations of the shoulder in adults and the ease of reduction early. How much more dangerous and difficult will the reduction be a few weeks or months after birth. In the most severe cases we can improve conditions very much at any stage, but we can never restore the joint to the normal after many weeks. The recognition of the subluxation is far from easy, although it is now being made much more frequently than a few years ago. The greatest obstacle to its recognition is the failure to think or look for it because of the general faith in the theory of a plexus rupture, and, therefore, the lack of incentive. The basic lesion, in my opinion, is the dislocation, anterior in adults and posterior at birth. The cases without dislocation are merely those in which the same causal force was not severe enough to produce a dislocation and stopped at a sprain. What has been most difficult in my work has been to show the kind and quantity of anatomical work on the cadaver which has preceded and laid the foundation for these now simple conclusions. For years it was my privilege to be associated with the late G. G. Davis, professor of applied anatomy in the University of Pennsylvania, and it has been my keen regret that the value of his work along this line probably never will be properly appreciated. For example, he studied the dislocation of the shoulder on the cadaver from every angle, and I came to feel that the dislocation of the shoulder which he produced and dissected in various ways was practically identical with that which occurred so commonly in life. The best things we know about dislocation of the hip has come from the study of that dislocation on the cadaver. The liberties I have taken in my observations on these various phases of traumatic brachial palsies, in adults and children, are rock-rooted in Davis's work on the cadaver, and my opportunities for studying his work and for trying to carry a few of his results over into surgical practice. Having faith in the similarity of the cadaver to the living dislocation, I felt that I had a new and valuable viewpoint and that I could safely venture a conception of the possible pathology of a dislocation of the shoulder. It is my conviction that there is much more of value to be gained from expanding the application of such a pathology.

CONJUGAL SYPHILIS OF THE NERVOUS SYSTEM[1]

By ALFRED GORDON, M.D.

It was in the year 1887 that the first authentic observation concerning conjugal paresis was placed on record. Acker[2] and Ziehen[3] report cases of two couples who died from paretic cachexia. In the following year Mendel,[4] besides confirming the observations of the two former authors with regard to paresis, brings also forth cases illustrating the occurrence of tabes in a woman whose husband was paretic. Since then a large number of cases have been published by French, German and American writers, showing that when one member of a married couple is suffering from paresis or tabes the other may also become affected with one of these two maladies, but not necessarily with the same form of the syphilitic disease. From 1887 to 1900 so many cases have accumulated in the literature that apropos of a discussion on conjugal tabes before the Paris Neurological Society by Souques,[5] Babinski remarked that when he finds himself in the presence of a married tabetic he invariably and systematically looks for symptoms of the disease in the other spouse.

Further observations have shown that not necessarily tabes or paresis will develop, but also slight or even very slight symptoms may be present in one member of the conjugal couple when the other is affected with either of the two serious diseases. They

[1] Read October 1, 1919.
[2] Allgemeine Zeitschrift für Psychiatrie, 1887, vol. xliv.
[3] Neurologisches Centralblatt, Mai, 1887.
[4] Zeitschrift f. Psychiatrie, 1888, vol. xx.
[5] Revue Neurologique, 1900, p. 338.

are the so-called "formes frustes" of tabes or paresis. Such were the observations reported by A. Marie.[1]

It was further observed that not only the wife will eventually develop the disease from which the husband has been suffering for years, or *vice versa*, but also the children living with diseased parents may become either tabetic or paretic. Such observations we find in the work of Bernstein and Artemoff.[2] In one case two sisters and in another a sister and two brothers developed paresis. A. Marc[3] also records the histories of three families, in every one of which several members were paretics.

In the present contribution are given the histories of thirty-two individuals. The following chief features were investigated: The onset of the affection in each parent and the date of its appearance in the second parent after the malady had existed in the first parent a certain number of years; the onset of the syphilitic infection in the original parent and the Wassermann reaction. It can be seen that not only tabes and paresis in their classical forms were present, conditions which were found by the majority of observers, but also other forms of nervous manifestations referable to the brain and spinal cord or to both. Thus in my series five such cases were observed. Comparing the date of appearance of the first symptom of tabes or paresis in the second parent with that of cerebrospinal symptoms of non-tabetic or non-paretic character in the same parent, we find that in the largest majority of cases the date of appearance of the former is much later than that of the latter. The number of years of the former ranges between seventeen and five years after marriage. As far as possible an effort was made to ascertain the medical histories of the wives prior to their marriage or of the husbands whose wives became diseased first. It is interesting to note that in the majority of cases of tabes or paresis symptoms appeared many years after the beginning of conjugal life. However, in cases in which second marriages occurred or legitimate marriage relations after separation from the

[1] Cited by Beaussart in Journal de Neurologie, 1910, p. 343.
[2] Journal russe de Neurologie et Psychiatrie, 1903, p. 698.
[3] Allg. Zeitschr. f. Psych., 1904.

first wife were maintained the appearance of syphilitic manifestations was earlier in the second wives than in the first ones. It is difficult to find a satisfactory explanation for this peculiar phenomenon.

The next interesting observation concerns the transmission of nervous syphilis to men heretofore healthy through the intermediary of women who developed syphilis of the nervous system many years after their first marriage to men having a positive Wassermann reaction. In one case, for example (4a), the husband had tabo-paresis at thirty-eight. His first wife lived with him five years. She later married a divorced man, presumably healthy, whose first wife brought him two healthy children. Eight years later both showed symptoms of tabes. In another case a married woman, who after having had three healthy children with her husband heretofore healthy became the mistress of a married man whose Wassermann reaction was positive and who when examined at fifty-one, showed signs of paresis. After five years of this double life she developed symptoms of tabes and her legitimate husband signs of cerebrospinal syphilis, with a positive Wassermann of the spinal fluid. In still another example (Cases 7a and 7b) two men, one single and the other married, heretofore healthy, had prolonged relations with one woman, who began to show symptoms of tabes one year after the death of her husband, who had a chancre one year before marriage. The single man, five years after continuous relations, commenced to show symptoms of cerebral syphilis (Wassermann positive of serum). The married man eight years later presented evidences of tabes, with a positive Wassermann of the spinal fluid.

Nervous syphilis may be transmitted not only to individuals who lead an intimate conjugal life, but also to persons who live constantly together in the same dwelling, such as close relatives who may come in daily contact with each other for years. In the case of 9a, for example, we see that she is twenty-two years old, always lived with her oldest brother, J. P. (Case 9), who at forty showed symptoms of paresis and whose two mistresses had respectively symptoms of cerebral syphilis and tabes. This sister,

whose parents were healthy and left five healthy children, herself a music-teacher and of excellent habits, commenced to show symptoms of cerebral syphilis at twenty-two, with a positive Wassermann of the spinal fluid. In case 10b, a young man, aged twenty-three years, never before had sexual intercourse. His father, a physician, married at twenty-seven and a year later the son was born. The father formed a liason with a woman whose blood and spinal fluid gave a positive Wassermann reaction. He developed tabo-paresis. The son presented at twenty-two symptoms of cerebral syphilis, with a positive Wassermann reaction of the spinal fluid.

The present study indicates also another important feature from a diagnostic standpoint. It shows that there were more positive Wassermann reactions of the spinal fluid in the second party, who developed nervous syphilis years after the beginning of conjugal life, than in the first party of the married couple (10 to 7). Conversely there were fewer positive reactions of the blood and spinal fluid combined in the first than in the second group (2 to 5). Moreover, in the two cases mentioned above (9a and 10b) in which there were no sexual relations, but merely cohabitation (sister and son respectively), the Wassermann reaction was positive only in the spinal fluid. This information is instructive from the standpoint of diagnosis, as it seems that one must not be content with a serum test in cases of individuals who have been living together for years and who present symptoms suspicious of a involvemen tof the central nervous system. A single such test may be deceiving. The foregoing observation points rather to the advice that in all such cases it is pertinent to commence with a biological test of the spinal fluid; if the latter is found positive (which is most frequently encountered) a blood test could be entirely avoided. It is only when the former is negative that the latter must be resorted to.

The conclusion which can be drawn from the present study is that conjugal syphilis of the nervous system, whether it is paresis, tabes or cerebral syphilis, is more common than it is generally believed, that it may be present not only in the wife after she

has cohabitated with the man for a number of years, but also in every other individual (sisters or brothers) living in the same dwelling with the affected person after a number of years. In the latter case the question of hereditary syphilis in the present study is entirely eliminated and has no bearing upon the subject under discussion. The few such cases in my series developed their affection long after the fathers became infected.

A few problems remain to be solved: First, by what mechanism is the infection transmitted to the wife and why the symptoms make their appearance in the latter so many years after she had cohabitated with the man. The query is particularly difficult for solution when it concerns relatives other than wife or husband, namely, persons that did not come into intimate relations with the original carrier of the disease. Another problem which requires discussion is why in some cases the wife develops tabes, in others paresis and in still others cerebral syphilis, also why in some cases she has the same form of nervous syphilis as her husband and in others a different form. Is it because in accordance with Edinger's exhaustion view, namely, that "one fatigues more her spinal axis and will develop tabes and the other overfatigues more her cerebral portion of the nervous system and will develop paresis?" These are all problems which in the light of our present knowledge cannot be solved categorically, but are all important subjects for consideration and reflection. It must be borne in mind that not only tabes and paresis, as it was formerly believed, but also all forms of nervous syphilis may be encountered in the other partner of the conjugal couple. Special emphasis deserves the occurrence of such conditions in sons and daughters who live with their affected parents irrespective of hereditary transmission of syphilis. A detailed account of the cases is as follows:

No.	Name, occupation, age and incidents of medical life.	Diagnosis.	Onset of syphilitic infection.	Wassermann test.
1	B. A., husband, book-keeper, age, 51 years	Paresis (unequal pupils; Argyll-Robertson K. G. ++; characteristic speech; expansive delusions.)	At the age of 25 years	+ spinal fluid.
1a	M. A., wife; age 40; married at 20; two miscarriages; two children, one living and well at age 17	Paresis; first symptoms at 35; depression; speech characteristic; Argyll-Robertson K. G. ++	.....	+ spinal fluid.
2	A. C., husband; peddler; age 45 years	Syphilitic myelitis (paraplegia; K. G. ++; toe phenomenon; bladder and rectum involved)	At 27 years	+ serum. + spinal fluid.
2a	S. C., wife; age, 41; married at 18; five children; two imbeciles; one epileptic	Tabes; first symptoms at 35 (shooting pain in legs; loss of K. G.; Argyll-Robertson; ataxia; loss of Achilles's reflex	.....	+ spinal fluid.
3	O. B., husband; age, 47; married at 27; clerk in law office	Paresis; first symptoms at 43 (depression; small and unequal pupils; tremor of lips; characteristic speech; K. G. ++)	At 20 years	+ spinal fluid.
3a	C. B., wife; age, 39; married at 25; 3 miscarriages; no living children; left husband before he showed symptoms of paresis; lived with another young boy of 19 presumably free from syphilis; became pregnant one year later, child living and healthy; eight months later commenced to show evidences of tabes; young man left her, and his further history could not be traced	Tabes (loss of K. G. and of Achilles's reflex; Argyll-Robertson; ataxia)	At time she left husband, her serum and spinal fluid were negative to Wassermann and Lange's test	+ serum + spinal fluid.
4	L. M., husband; bank-teller; age, 38; married twice, at 29 and 35	Taboparesis (expansive; K. J. lost; pupils unequal; optic neuritis; history of gastric crises and of lancinating pain in limbs; tremor paretic speech)	Infection at 20 years	+ spinal fluid.

No.	Name, occupation, age and incidents of medical life.	Diagnosis.	Onset of syphilitic infection.	Wassermann test.
4a	First wife (A. M.), married at age of 19; one miscarriage; one living and healthy child; separated at 24; married a divorced man of 30, presumably healthy, whose first wife brought him two healthy children; eight years later both showed symptoms of tabes	Tabes (loss of reflexes; narrow pupils; Argyll-Robertson; ataxia)	.....	+ serum.
4b	Second wife (N. M); married at age of 26; two miscarriages	Headache (persistent and with paroxyms of unusual severity; the K. G. ++; no other symptoms)	.....	+ serum.
5	J. O'B.; teacher; age, 45; married twice	Cerebrospinal syphilis (headache; palsy of cranial nerves; memory poor; K. G. unequal; sphincters disturbed)	At 20 years	+ serum and spinal fluid.
5a	First wife (L. O'B.); married at 20; heretofore never ill; one miscarriage after which separated (five years after marriage); married again a year later; one child apparently healthy; 7 years later symptoms of tabes; husband healthy.	Tabes (loss of reflexes; ataxia; pupils very small)	.....	+ spinal fluid.
5b	Second wife (A.O'B.) married at 28; heretofore healthy; one dead born child; left husband six years later, but did not marry again, and lived a secluded life with parents; soon became manager of father's business (large export commerce); seven years later symptoms of paresis	Paresis (depressive form; amnesia paretic speech; attacks of transient aphasia; K. G. ++	.....	+ spinal fluid.

No.	Name, occupation, age and incidents of medical life.	Diagnosis.	Onset of syphilitic infection.	Wassermann test.
6	F. D.; official of railroad; age, 51; one legitimate and one illegitimate wife	Paresis (expansive; paretic speech; tremor; K. G. ++ unequal and irregular pupils)	Denied	+ spinal fluid.
6a	First wife (S. D.); legitimate; married at 20; heretofore in excellent health; two miscarriages; one child epileptic; one child healthy; began to show symptoms of tabes at 32	Tabes (loss of reflexes; ataxia; lancinating pain in limbs Argyll-Robertson pupils)		
6b	Second wife (mistress), (A. O'H.); a married woman; had three healthy children with her husband; heretofore healthy; after five years of double life she developed symptoms of tabes and the husband signs of cerebrospinalsyphilis(with positive Wassermann of spinal fluid	Tabes (ataxia; loss of reflexes; unequal pupils)	.....	+ spinal fluid.
7	Widow, E. R.; age, 35 (husband died at 38 following an apoplectic attack; had a chancre at 27, one year before marriage); she had sexual relations with two men; began to show symptoms of tabes (one year after husband's death)	Tabes (ataxia, marked diminution of reflexes; Argyll-Robertson of one pupil)	.....	+ spinal fluid.
7a	Man (S. Y., single), 40; book-keeper had relation with the woman, No. 7, for 5 years; soon commenced to show symptoms of cerebral syphilis	Cerebral syphilis (headache, poor memory; somnolence)	Denied	+ serum.

No.	Name, occupation, age and incidents of medical life.	Diagnosis.	Onset of syphilitic infection.	Wassermann test.
7b	Man of 38 (C. S.); married; salesman; two healthy children; had relations with woman No. 7 for eight years, when he commenced to show symptoms of tabes	Tabes (lancinating pains; ataxia reflexes obtained with difficulty and only occasionally; bladder-frequent retention Argyll-Robertson unilateral)	Denied	+ spinal fluid.
8	D. McC.; age, 42; bookbinder	Taboparesis (expansive form; loss of reflexes double optic atrophy; ataxia attacks of Petit Mal)	At 20 years	+ serum and spinal fluid.
8a	S. McC., wife; married at 20; one miscarriage; two mental defective children at 30; began to show evidences of paresis	Paresis (depressive form; K. G. ++; unequal pupils; paretic speech; tremor of tongue and fingers)	.....	+ spinal fluid.
9	J. P.; age, 40; single; teacher	Paresis (depressive form; characteristic speech; tremor of hands and lips; K. J. ++; unequal pupils)	Denied	+ spinal fluid.
9a	Mistress (1st) of J. P.; age, 29; had relations with him for 6 years; never was married before; commenced to show signs of tabes at 29	Tabes (shooting pain in the legs; ataxia; K. G.; loss of Achilles' tendon reflex; Argyll-Robertson of one eye)	.....	+ spinal fluid.
9b	Mistress (2d) of J. P.; age, 31; relations with him for 8 years; first headache at 25	Severe and persistent headache; some disturbance of micturition; K. G.; markedly diminished	.....	+ serum and spinal fluid.
9c	Sister of J. P., age, 22; lives in the same house with him, since infancy (parents left five healthy children; died in an accident); heretofore in good health	Severe headache; Argyll-Robertson pupil of one eye	.....	+ spinal fluid.
10	J. H.; age, 50; physician; married at 27	Taboparesis (expansive form K. G. and Achilles lost; bladder disturbance; some ataxia)	At 32 (from his mistress whose blood showed + Wassermann	+ serum + spinal fluid.

No.	Name, occupation, age and incidents of medical life.	Diagnosis.	Onset of syphilitic infection.	Wassermann test.
10a	M. H., wife; age, 48; married at 22; first signs of the affection at 38; two miscarriages and one son; latter born one year after marriage	Tabes (ataxia; sharp pain in legs; K. G. and Achilles' lost; Argyll-Robertson of both eyes	.....	+ serum.
10b	D. H., son of J. H.; single; age, 23; bookkeeper; first signs of the affection at 22	Persistent headache; marked diminution of reflexes, pupils react to light weakly	.....	+ spina fluid.
11	W. J.; age, 39; merchant; married at 25; first signs of visual disturbance at 27	Blindness from double optic atrophy; K.G. much diminished	At 20 years	+ serum + spinal fluid.
11a	A. J.; wife; age, 33; married at 19; first signs of visual disorder at 30	Blindness from double optic atrophy; slight ataxia in gait	.....	+ spinal fluid.
12	W. K.; banker; age, 49; married twice; at 27 and 35; first evidence of disease at 38	Paresis (expansive form; irregular and small pupils; paretic speech; K. G. ++)	At 20 years	+ serum + spinal fluid.
12a	First wife, M. K.; married at 19; divorced after 5 years; no children; one miscarriage; first signs of disease at 28	Tabes (lost reflexes; bladder disorder; sharp pains in lower limbs)	.....	+ spinal fluid.
12b	Second wife, A. K.; married at 32; no children; first signs of the disease at 40	Paresis (depressive; attacks of Petit Mal; K. G. ++; paretic speech; tremor of lips; pupils unequal	.....	+ spinal fluid.

PLASTIC OPERATIONS ON THE NOSE AND EYELID[1]

By MAJOR D. H. GILLIES

It is a very great pleasure tonight to find myself in your beautiful city, and the last few hours I have enjoyed more than any part of my visit. I have been treated with great kindness and hospitality, and I regret that I must ask you to forgive me if I do not read you a set paper. I thought perhaps it would be easier for me and easier for you if I may be permitted to show you pictures of injuries, taking first that class of cases in which the bridge of the nose is destroyed. Then I will deal with the loss of the tip, the lower half of the nose and the whole nose. I will then pass on to the eyelids, and with your permission I will show one or two other cases in which I had the assistance of Major Dorrance at the Queen's Hospital at Sidcup.

Case I.—Belgian officer, injured while doing secret service work when he had the bridge of the nose crushed in. This is the simplest form of nasal deformity and probably gives the best results. A piece of cartilage was taken from the rib and inserted and the result is quite good.

Case II.—A similar case, in which there was loss of tissue. The splint shown was worn for seven weeks to support the nose until the cartilage should be inserted.

Case III.—Interesting from a psychological point of view, that of a young woman of twenty, the "ugly duckling" of the family. A piece of rib inserted in her nose has made her quite a different person. The deformity had been caused by an injury early in life followed by a submucous resection.

[1] Read November 5, 1919.

Case IV.—An Indian mutilation of the tip of the nose, repaired by building on a new tip and alæ over the remains.

Case V.—Lupus of the nose, treated by a process of mine which is original. Small double epithelial flaps are turned off from the right and slipped over toward the left. A new columella and fresh tip were made from the forehead in the method described.

Case VI.—Injury from motor-car accident, in which the tip of the child's nose was cut off. The interesting part is whether now the nose will grow as rapidly as the boy. We dare not insert cartilage lest it remain too small.

Case VII.—Typical case of rhinoplasty, such as I have been practising.

Case VIII.—All scar tissue is excised and healthy skin is drawn to healthy mucous membrane on the inside. This principle should have been more quickly grasped in the surgery of the face. The principle should have been carried out that with considerable loss of tissue involving mucous cavities, mucous membrane should be sewed to skin rather than tissue approximated across too large a gap.

Case IX.—One in which a Wolf graft should have been used but the patient did not wish to have it. I use the skin of the forehead when feasible, since it more closely resembles the skin of the nose in color than other skin of the body.

Case X.—A typical case, in which the tip is divided from the bridge of the nose and returned to normal position; skin is sewed to mucous membrane around the mouth. That could have been done at the time of injury. Cartilage is embedded above the tip, then reflected from above down on the blood supply.

Case XI.—Loss of eyebrow treated by implantation of cartilage.

Case XII.—Cicatricial ectropion of the eyelid treated by an operation which I call "epithelial outlay," my modification of the Esser operation, the incision being made on the outside. The method is an exceedingly satisfactory one of skin-grafting of the eyelid.

Case XIII.—Severe burn in which the principle of tubing the pedicles was used.

Numerous other cases were shown.

DISCUSSION

Dr. Gillies: May I say that I have never seen a case which could not be repaired. I have seen failure result in many instances because efforts at repair were not properly directed. The only part of the face which cannot be repaired by plastic operation is the eyelids when they are completely lost and there is no muscular movement left. There, fortunately, the artificial eye gives the most satisfactory result.

THE TREATMENT OF AMBULATORY FRACTURES[1]

By JAMES B. MENNELL, M.D.

When I arrived in this country a little more than a month ago found awaiting me an invitation from my friend, Dr. Tait McKenzie, in which he did me the honor of inviting me to visit you tonight to give "a talk on the treatment of fractures." My dismay was considerable when I happened to read in the *Weekly Roster* the announcement that I was expected to read a paper entitled "The After-treatment of Fractures by Massage." I must therefore begin by apologizing for the fact that I am unable to comply, as I have had neither time nor opportunity to finish a set "paper." Then, too, I am unable to speak of the treatment of fractures by massage, as, so far as I know, such treatment does not exist. If it does the sooner it ceases to do so the better.

I know that many people labor under the delusion that Lucas-Championnière and his disciples preach the treatment of fractures and other types of recent injury by massage, but a delusion it is, and I want to emphasize this point as its importance cannot be overestimated. It arose in the inherent laziness in speech of the average Anglo-Saxon, who has an altogether unlaudable tendency to abbreviate any title of considerable length. The great French master wrote and preached "the treatment of fractures by massage and mobilization," and this has been abbreviated by the omission of the last two words, leading inevitably to a fatal misconception of his teaching. For my own part I always write of and speak of the "treatment of fractures by mobilization and massage," and the

[1] Read November 5, 1919.

last two words can be deleted without any material loss, for the whole aim and object of the therapy advocated is the abolition of undue immobilization and the substitution therefor of scientifically administered mobilization.

"The public," said Dr. W. Mayo, at the recent Congress of American Surgeons in New York, "has been almost unconscious of the growth of preventive medicine, and but little has been accomplished along these lines in comparison with all that may be done." Again, "The people should be made to understand that the state is culpable if its citizens are allowed to become ill through manifest neglect." Taking these two statements as our text, let us see how far they apply to cases that have sustained fracture. Since the war there has been a perfect avalanche of literature concerning new methods of splinting of fractures, the aim of each being to restore more perfect anatomical alignment. Thereby much has been done to prevent the occurrence of deformity. This, of course, is preventive medicine, and so far it is good. But it is not enough. For who can doubt, when they see the intense stiffness, pain, loss of function and general disability, that so often follow the most simple fractures, a rigid hand after fracture of the humerus or a broken metatarsal arch after fracture of the femur for example, that these disastrous sequels are not due to the bony injury? Far from it! They are due not to the fracture but to the treatment meted out to the fracture. Our first duty after fracture is to ensure, as far as we may, exact restoration of the shape of the bone, but this is not all. Our patients are not made of bone, and surely there is something very wrong in a treatment that confines its attention to one structure that has been injured, and ignores the damage done to all others in such a way that the one thing is remedied, it may be, while the lack of attention to the others leaves in its train a loss of function which it is often well-nigh impossible to restore. For only too often the actual damage done to a bone that is broken is insignificant when compared to that done to other structures at the same time.

We see, then, how truly Dr. Mayo's statement applies to the treatment of fractures when he says "how little has been accom-

plished along (preventive) lines in comparison with all that may be done." It is impossible to attribute the disability and loss of function that so often follows fracture to "manifest neglect," although they are only too often the result of treatment rather than of the bony injury, for the treatment by immobilization is still the classical teaching. Yet the claim of preventive medicine is so strong that I cannot help hoping that the day will yet come when the treatment by mobilization, which alone can eradicate these evils, will be the rule rather than the exception.

I am often asked this question, "Are you not afraid that treatment by mobilization will prevent union?" Time does not allow me to argue this implied criticism, as I have done fully elsewhere. I must content myself by reminding you that absolute immobilization after fracture is always seen in one situation, while in another it is quite impossible to impose it. What is the result? The absolute fixation of the bones of the skull invariably prevents their reunion after fracture: the ribs on the other hand always unite with an excess of callus, not in spite of but because of their imperfect immobilization.

Now the whole secret of the treatment of fractures by mobilization is a postural one, and we do not aim to secure any mobility during treatment between the fragments. If we do we invariably see an excessive callus formation. On the other hand, by careful attention to posture, we can so arrange the injured part that the action of gravity will secure that any movement which takes place as the result of the relaxation of muscular spasm will tend to the reduction of any deformity which may exist. This mobility between the fragments, and this only, is what we aim to secure. The first essential, therefore, is to study postural treatment. Fractures of the clavicle, for example, are treated recumbent with the elbow supported; those of the humerus are treated sitting up.

Having so arranged the injured part that, in the absence of protective muscle spasm, gravity (combined with the use of slings, pillows and even of splints) will tend to maintain the fragments in perfect position, or, if deformity is present, will tend to allow them to drop into position, we can begin more active treatment.

And the first step to be taken is massage. There is nothing mystical about the administration of massage; it is not an occult science. It is probably the most elementary and simple procedure in the whole of our medical armamentarium. It consists of stroking and the gentlest of squeezing. Why do we use it all? The answer is simple. There are three, and only three, possible actions of massage:

First, it can act by reflex.

Second, it can act mechanically.

Third, it can act by securing reflex response of unstriped muscle to mechanical stimulation.

We use massage in cases of recent injury with the first and third aims only in view.

After all fracture there is reflex disturbance, paralytic in nature and of the vasomotor system. By our stroking massage we are able, by reflex, to aid materially in the restoration of this vasomotor disturbance. I have argued this tentatively for many years. I am now bold to assert it since Prof. Arthur Keith stated in a lecture last year that he agreed with me that the reflex action of massage was the most probable explanation of its efficacy in the treatment of recent injury.

Now, after fracture, damage has been done which has to be repaired; and repair is only possible within the body in the presence of an adequate vascular supply. If we immobilize a healthy limb the very fact that movement is withheld decreases the supply of blood to the limb: if we treat similarly a limb in which a bone has been broken we add this disadvantage to that already present, due to vasomotor disturbance. Small wonder that repair, as evidenced by callous formation, is slow and poor when compared with that seen if we employ massage and mobilization.

A further result of the reflex action of massage is seen in the simultaneous relief of spasm and of pain. The more I see of fracture work the more convinced I am that nine-tenths of the pain of fracture is due to cramp, the result of a reflex spasm which is protective in nature. This at least is certain that, given proper attention to postural treatment, the pain of fracture can be greatly

relieved by massage and muscle spasm can be practically obliterated. No amount of treatment will have either effect if relaxation of spasm will allow disadvantageous movement between the fragments. On the other hand it is frequently possible not only to allow but to assist restoration of outline when deformity is present by means of massage combined with adequate assistance and support. And in proof thereof, I demonstrate from time to time the almost painless reduction of a dislocated shoulder under the sole influence of massage. Spontaneous reduction is rendered possible solely by the relief of spasm as the direct result of massage.

That unstriped muscle responds by contraction to mechanical stimulation is well established, and that undue stimulation results in a paralytic ileus is known to all abdominal surgeons. By judicious mechanical stimulation, with our massage we are able to assist further the toning up of the circulation; but great care must be used lest, by overstimulation we actually cause a paralytic dilatation of the arterioles.

Force in massage, unevenness, all sudden movement and so forth is absolutely contra-indicated in the treatment of all recent injury. The movements must throughout be smooth, gentle and rhythmical.

This is the reason why it is unsafe to entrust this treatment to those who have been accustomed to treat solely chronic cases of injury and medical diseases. A special technic is essential to success, but it is the embodiment of simplicity. It is rather previous training in more vigorous treatment that renders the technic difficult.

Another thing that acts inimically to repair (insofar as pressure is inevitable), and which in turn impedes circulation, is the bandaging on of splints. Now splintage in some form or other is essential after fracture, but it should be as simple as possible and exert as little pressure as possible. If we are going to loosen and adjust our splintage day by day the necessity for firmness in fixation is reduced, and therefore circulation is less impeded. Our aim and object is to render our splintage as simple and as soft as we can, and apply it so as to ensure it shall remain in place for twenty-four

hours only. This is a great asset in treatment, but there is a further advantage: Only too often after forcible reduction has been performed and splintage applied roentgen-ray examination will reveal "fragments in good position." Yet if our splintage has been faulty we not infrequently find deformity on removal of our splints at a later date. If the fracture is inspected day by day this disaster can be recognized and remedied.

As soon as pain and spasm have been relieved, not before, and, if we fail to secure both our technic is a fault, we administer a dose of passive movement. Now there are three schools of thought on this subject: The one I represent claims it to be invaluable, a second describes it as dangerous and a third as futile. Now those who call it dangerous are ignorant as to its nature, and they fail to distinguish between "passive" movement and "forced" movement. The point is this: Passive movement, to be "passive" at all, can only be administered in the presence of complete muscular relaxation. If the muscles assist we are giving a dose, not of passive, but of assistive movement; if they resist we are administering resistive movement. The essential antecedent to passive movement is complete relaxation—voluntary relaxation on the part of the patient—of all muscles connected with the limb. If the administration of passive movement tends to displace the fragments, inevitably there will follow reflex protective spasm, relaxation is no longer present and true passive movement will no longer be possible. Forced movement is dangerous in the extreme: from its very nature passive movement, as properly understood, can do no harm.

We have now to see how far it is futile. Our whole object in treatment is restoration of function, which in turn depends solely on voluntary action and use. How far then can passive movement assist this restoration? If we use passive movement as an end in itself it is indeed futile. But just as we use massage as a means to secure passive movement, so we use this in turn as a means to secure active movement—if not today or tomorrow—though this is often possible, yet on the earliest possible morrow.

The objectives in view in the administration of passive movement are these:

1. Mobility of the joints is maintained by the very fact that they are moved.

2. Adhesions are prevented from forming. In the presence of complete relaxation movement entails no strain whatever on any normal structure. This is axiomatic. If the movement entails strain on any structure, however slight, the movement is a forced movement. On the other hand if passive movement takes place at all, all normal structures must move in their true anatomical relationship to one another and no adventitious band can form between. Here we see the value to early treatment. If these bands have formed, forced movement alone can tear them.

3. Passive movement hastens repair, because

4. It assists the lymphatic and venous circulation, and

5. Probably assists in restoration of the vasomotor disturbance by reflex.

6. The elasticity of the muscles is maintained. Now muscle has one vital property and two vital functions. Its property is elasticity, its functions are contraction and relaxation. By maintaining the elasticity we ensure that it shall be ready to perform its functions to the full without impediment as soon as repair has advanced far enough to allow activity.

7. The administration of passive movement is often productive of further movement, insofar as a dose of movement in one direction often enables us to secure passive movement in another that was previously impossible. It is thus an aid to consolidate, as it were, the relaxation secured by the massage. Thus it often assists us in the restoration of deformity and the maintenance of that muscular relaxation which alone ensures that the restored position is maintained.

8. Passive movement also serves one invaluable function that is completely ignored whenever prolonged immobilization is prescribed. This is the preservation of the joint sense, a sense that is developed comparatively late, and therefore one that is lost all the more readily. Yet on this sense depends the power of co-

ordination of movement, which, of course, it is essential to restore before full function of the part can return. The more we are able to keep this sense unaffected the more perfect and more rapid will be the return of function. Once lost the power of coördination is often most difficult to restore, and the time spent in regaining it prolongs convalescence considerably. Active movement throughout a limb being, as a rule, impossible soon after fracture, in passive movement alone we have an agency that can prevent (or at least minimize) loss of the power of coördination owing to interference with the joint-sense.

9. But the whole aim and object that we have in view is restoration of function and our duty is to do all in our power to hasten this end. There is only one means we can employ toward this end during the days that must inevitably be devoted to consolidation of the union of the fragments, and this means is passive movement.

Some inquirers seem to be in doubt as to how much passive movement to give, how frequently to repeat it and how to judge whether they have passed the limit of safety. Experience is the surest guide; but, failing this, it is probably safe to say that any range of movement which can be performed without exciting the least flicker of reflex or voluntary movement in the patient's muscles can be administered without danger. In children, however, this is not the case; and, speaking generally, it is not true of fractures in the neighborhood of the elbow-joint. Here, if the joint surface is broken, so as to allow free access of synovial fluid to the space between the fragments, movement should be pushed to the fullest possible extent provided always that it elicits no pain. In all other cases of fracture near the elbow, movement should be administered with a grudging hand. For at least two weeks after injury it is usually unwise to open out the angle at the elbow beyond 60 degrees. Even after this it is sometimes wise to "go."

The question of repetition of a passive movement is soon answered. There is no possible use in repeating a movement unless we hope thereby to secure a wider range of movement at each attempt. In other words, the maximum range of passive move-

ment that is administered on any one day should be attained once only.

The danger signals by which we know when we have gone too far are, of course, familiar to you all, for they are elemental. Increase of pain, increase of swelling or decrease of mobility—any one or all together—afford incontestable evidence that too much has been attempted.

Treatment by mobilization does not consist of the administration of passive movement. This is merely a means to an end and treatment is almost invariably incomplete unless a dose of active movement is definitely prescribed. Even if the prescription is only active movement of the fingers after fracture of the humerus, or of the toes after fracture of the femur, it should none the less be considered an integral part of treatment. The art of prescribing an ever-increasing dose of active movement day by day is by no means as simple as it sounds, but a little ingenuity usually renders a daily alteration of prescription possible. Not only should range of movement be kept in mind, coördination in movement should also be studied. The same laws govern the prescription of active movement as apply to the administration of passive movement.

Time does not permit me to go into the details of the treatment of individual fractures. Let us compare, therefore, the treatment here advocated with that of prolonged splintage in one concrete instance and see which is the more rational. Let us take as example a fracture-dislocation of the ankle. Under the one regimen the dislocation is reduced and the limb is placed in a plaster mold, which is removed at some future date, usually varying from six to eight weeks, according to the fancy of the surgeon. The cast is then thrown away and the patient is advised to begin to use his limb, perhaps with a crutch or cane to help him during the earlier stages.

Now surely if a patient is to be allowed to put any weight upon his limb, some active movement for the ankle might have been prescribed at least two weeks before *without weight*, and passive movement, such as I have described, a week earlier still. As a

matter of fact, there is no reason why the cast should not be transformed into a bivalve after the lapse of five to seven days and massage of the stroking variety applied. The patient should be encouraged to move his toes and to keep his quadriceps active. Although no movement of the knee is possible, yet these activities will ensure an increased supply of blood to the limb.

A week later, provided it has been fitted beforehand, the limb may be lifted from the cast in a cradle of lint and deposited on the bed with the calf supported so that no weight rests on the heel. The joints of the foot can now be mobilized and passive movement of the ankle begins. A few days later the knee can be moved and, by the end of the third week at latest, the patient can hang the leg over the side of the bed and practice knee movements and early ankle movements. Next he sits on a chair and practices toe-tapping and heel-tapping on the floor until he can perform a regular jog-trot. No weight is placed on the foot. Between the exercises the limb, of course, is replaced in the cast, which, however, can be cut below the knee at the end of the third week at latest.

Now what is the comparison? At the end, say, of six weeks, the first patient has a swollen, weak, painful and almost rigid member: the second has one in which circulatory disturbance has been restored, the joints are supple, movements are free from pain, muscular power is only slightly diminished and coördination is intact. In other words, the one has months of painful convalescence in front of him, the other is ready to resume in full the function of his limb according to the degree of consolidation at the site of fracture.

Before I close let me issue a word of warning. In children and in the aged the dose of massage should be small; in children mobilization should be administered or prescribed with a niggard hand; in the aged passive movement should be encouraged to the full. For fractures in the neighborhood of joints mobilization treatment may afford the only chance of perfect restoration, or at least can effect a greater saving of function than any other treatment. If the fracture involves the cartilages and synovial fluid escapes between the fragments it acts as a foreign body and

inhibits callous formation. The invariable law in this case is to push passive movement to the full; if the joint surfaces are intact, however, all movement must be given or prescribed with the utmost caution. The three danger signals already mentioned must invariably be regarded as indications of an excess of zeal in treatment.

Such, then, in brief is the treatment of fractures by mobilization and massage. True, the treatment actually hastens repair and thus far is curative. But far more is it an integral part of preventive medicine, preventing stiffness, pain, loss of power and of coördination, and as such I submit it to you for your earnest consideration.

DISCUSSION

Sir Robert Jones: I, of course, respond to your desire that I say a few words following Dr. Mennell's paper. I know Dr. Mennell's work and of his association with the work at Sidcup and St. Thomas's hospitals, where it is an inspiring experience to go about his clinics. It is a very interesting thing to see thirty or forty children being cared for by Dr. Mennell and all looking upon him as if he were the father of them all. I think it is too late to enter into a full discussion of massage and fractures which have so many side lights, and I will only say that Dr. Mennell's work is of the highest type it has been our experience to see.

Dr. John B. Roberts: I do not think that this important paper ought to go without some word of comment. We in America know that the lawyers get their common law from England. I think we see tonight that we surgeons must get our common sense from that great country. It seems to me that we have within the last few years discarded the old idea that we must never open a fracture to look at it and see what is needed. It seems to me also that in America some of us were too conservative, following the very enthusiastic and delightful lead of Sir Arbuthnot Lane to do things we ought not to have done. Tonight comes to us a gentleman who brings the other side, the side so far away from the teaching of Sir Arbuthnot Lane that we ought to have common sense put into us after tonight's meeting.

Dr. R. Tait McKenzie: My attention was first drawn to this subject by the large number of cases that came to us at the convalescent camp at

Heaton Park. Most of these cases had been kept inactive by splints too long, and with most disastrous results. We treated them as best we could with rather crude means, and it is a special privilege to hear the underlying principles of the treatment explained so lucidly and convincingly. Personally, it has been a great pleasure to me, and I know to many of the Fellows of the College, to have heard this most scholarly paper.

If I might make a remark about the previous paper, I would like also to congratulate Major Gillies on the work at Sidcup. The psychological result of these terrible deformitories is something we cannot realize unless we have seen all forms. Some of these poor fellows came in with their whole face shot away, but in spite of this they were in almost perfect health. It is no wonder there were suicides among them. There are perhaps a few cases not mentioned by Major Gillies in which the deformity is such that no plastic operation can be relied upon to restore the destroyed face. These cases can be treated only by some form of mask. Of course, when it was possible to do a plastic operation this was much to be preferred. When this was impossible a good deal of work was done, particularly at the Second London General Hospital, by constructing masks made to resemble the lost features. A cast of the face was taken, the missing features modelled upon it, and by electrical means a thin copper film deposited on it. This was trimmed, fitted, colored and attached to the face, usually by spectacle frames, so that a man was made at least presentable. The process is described in full in "Reclaiming the Maimed." One case of that kind was sent to me by W. L. Clark, in which the entire face was gone from the bridge of the nose to the lower mandible. The man had been a carpenter throughout the most of his life, but was obliged to give up his trade, so repulsive was his appearance. After some time we succeeded in getting a mask which fitted him, and by putting on a false moustache and appropriately coloring the mask a very satisfactory result was obtained.

Dr. Mennell (closing): I do not mean to give the impression that the treatment of all fractures should be by mobilization and massage. There are fractures which we cannot reduce, and here we must do an open operation. We would start our treatment by mobilization and massage as soon as possible after operation to get the best results. One word of warning I feel you will allow me to give, is not to massage the old person, or the young person much. If a joint is not open and the fracture is near it, go slowly or disaster will follow.

S. WEIR MITCHELL: PHYSICIAN, MAN OF SCIENCE, MAN OF LETTERS, MAN OF AFFAIRS[1]

By CHARLES W. BURR, M.D.

Though the College founded the Weir Mitchell oration December 2, 1914, within a few days of five years ago, this is the first address given under the terms of the resolution. The explanation of the delay is simple. Though the United States for three long, dismal years was held back from the performance of its duty by a timorous administration, reeking with inefficiency, pretending to be saturated with idealism, taking advice from idols of the parlor socialists, flirting with real socialists, striving to lead the people away from their strong and healthy belief in Americanism to the worship of the false god Internationalism, and having at its head a President who was slow to learn that worse things may come to a country than war and that upholding national honor is nobler than maintaining a disgraceful peace, individual Americans were doing their duty; many Fellows of this College, many men from all parts of the country, were already giving themselves up to the great task in hand and, for that reason, a speaker could not be had. Men of worth were doing, not talking, and even those of us, like myself, left at home had little time to think of the dead. The World War is over, another has replaced it, has come partly in consequence of it, and the curtain of futurity, ever retreating but never rising, hides an unending succession of tomorrows. But whatever the future may contain for us, we may safely, for a moment, forget

[1] The Weir Mitchell Oration, delivered at the College of Physicians, November 19, 1919.

the present sickness of the world and go back to old habits, one of the best of which is the study of the lives of the illustrious dead.

It was very properly decided that the first oration should be devoted to a study of Weir Mitchell himself, and the College has conferred upon me the honor of making it. I wish now, at the beginning, to thank the Fellows for the opportunity they have given me to speak concerning one of the two men who did more to influence my intellectual life during my later adolescence than all others. To Weir Mitchell and William Osler I owe a debt. These two men opened for me, as for many others—rather they showed us how to open for ourselves—the gate that bars the way to fruitful study, ignorance of scientific method. They had sympathy with our desire to learn how to satisfy intellectual curiosity. Above all, they taught us the paramount necessity of intellectual honesty. I can give no higher praise than this. I purpose to speak of Mitchell as physician, man of science, man of letters, man of affairs. I do not purpose, nor can it be done in the short time at my disposal, to give a detailed biography of the man. Indeed, biography, as a rule, is a sorry business, unless written by someone who knows the real soul of the man, and then usually favoring prejudice prevents clear seeing. I had no such close personal relations with Weir Mitchell. I was too much his junior to write his biography from my personal knowledge. Of his youth I know little, mere shreds and patches of half-remembered stories, and for this I am sorry, because early in adolescence there appear signs, marks and tokens, had we only the eyes to perceive them and the knowledge to comprehend, from which we could prophesy with certainty, barring disease and accident, the boy's whole mental and moral future. The story of the boyhood of a man like Mitchell, written by a real psychologist, a real student of behavior, would be a valuable contribution to our slight knowledge of mental development in the individual. A thousand such would be of incalculable value. As I have said, I know little of Mitchell's boyhood, but when his autobiography is published, in his officially written life, there will be revealed how it impressed him years after, when he had attained middle life or early old age. Such impressions are

never accurate. A man sees his boyhood through a mist; it may be roseate or somber-hued, but always it is there, the mist of memory falsified. One thing is certain, he was not precocious, but slowly and steadily grew to maturity, nor did he stop then, but continued to grow through the later years. His intellectual horizon continued to broaden after the period in which in most men the mind is fixed, set, crystallized, brittle. This characteristic, as well as endurance, which causes the mind to continue bright, active, alert and willing and able to accept new ideas until a very advanced age, is, I think, more common among men of affairs, doers, than among pure thinkers. Many great statesmen have lived long, most great poets die at an earlier age. Those whose only ability is to talk do not, for some mysterious reason, as a rule, attain great age. In that the gods are kind to us. Mitchell was not one of those children who startle by their brilliancy and make the wise old family doctor fear for the future, knowing full well such brilliancy more often portends a mental smash-up and moral degradation in adolescence than fruitful genius. That he was an imaginative child there is no doubt. Let me tell a story that reveals it. When about seven years old he told his mother he had just seen a golden chariot with horses and trappings. She, not realizing that he, like all imaginative children, had in very truth seen a vision, seen by the physical eye the thing he dreamed of, chided him for untruthfulness. He felt the injustice of the charge, never forgot the incident, and years later, during his professional life, many times warned parents to be careful, when their children related such things, not to mistake richness of imagination for poverty of the moral sense.

Mitchell was fortunate in heritage and environment, in nature and nurture. The first is the more vital, because good inheritance may, and often does—we see it daily—overcome the evil of bad environment. He came of a high class, intellectual and scholarly family. His father was not only a distinguished physician but a man of science. He himself passed all his youth in an atmosphere of books, and, as a boy, he had that best education, hearing his elders converse on things worth talking of. He was, I am told, a

bookish boy and early showed a love for poetry. He belonged to a generation in which it was the custom to read the Bible, and he was unconsciously but profoundly influenced in his literary style, years after, by the reading. Of course, today we have progressed so far that reading the Bible, like reading history, reading anything older than the twentieth century, is regarded as a waste of time. Our problems, the moderns tell us, are all new; our world is new; old times can teach us naught. But old proverbs continue true, and if pride goeth before destruction, ignorance causeth destruction.

I suspect that environment had a large influence in leading Mitchell into medicine. His father, being a physician, could help him materially. He had lived all his life in a medical atmosphere, and I am inclined to believe that had not these external things existed his inclination toward literature would have proved stronger than that toward science and he would have been purely a man of letters. The two have much in common. Art and science are not as unlike as they seem: both require of their disciples imagination; science demands also compelling curiosity to learn causes. Literature is the study of the adventures of the human soul; science the study of the adventures of the universe and the why of things. At all events, whether it was the pull from within or from without that controlled him, after ending his collegiate studies at the University of Pennsylvania he entered Jefferson Medical College and graduated in 1851. Early in his medical career he showed he was being driven by influences within himself toward scientific investigation.

His early professional life was not all beer and skittles; it was a period of hard, grinding work and heavy responsibilities. Mr. Talcott Williams tells us that, in the autobiography, it is recorded "that in the ten years after he began the practice of medicine his receipts in practice were only a thousand dollars, and in that year he had suddenly thrown upon him the responsibility of caring for his father's family and was approaching his own marriage." But his nature asserted itself. He was not content to be merely an every-day doctor, mechanically, routinely, without mental interest, dealing out pills and potions. The scientific instinct

ruled him. In 1853 he was elected to membership in the Academy of Natural Sciences, and two years later was placed upon the Library Committee. In 1858 a biological section of the Academy was instituted on the petition of Mitchell, Leidy, J. A. Meigs, Hammond, Hays and others. At the first meeting Mitchell presented the first paper on "Blood Crystals of the Sturgeon." Years after, when the whole biological point of view of men of science had changed mightily, Mitchell's interest in the subject came to the front again, and he furthered the great work of Reichert on the crystallography of hemoglobin. He was one of the founders of the Pathological Society of Philadelphia, the nursery of men of science ever since, for there the young may, unhampered by the aged, discuss the newest thing and prove it true or false. The first meeting was in 1857, and again he presented the first paper. From the time of his graduation until 1863, which was a turning-point in his career, for then he assumed charge of an Army Hospital for Nervous Diseases, he had written twenty-two scientific papers, none of them being clinical, but all in the domain of physiology, pharmacology and toxicology. During a part of this time he was lecturer upon physiology in the Philadelphia Association for Medical Instruction, an organization for extramural teaching. He wrote on arrow and ordeal poison and on snake venom, was the first to describe the chiasm between the laryngeal nerves in turtles and observed the almost total immunity of pigeons against opium. The most valuable contribution he made previous to his war work was his monograph on the venom of the rattlesnake, published in 1860 in the Smithsonian Contributions. In speaking of it, Dr. William H. Welch said at the Mitchell memorial meeting, held in this hall, that investigation of snake venom held Mitchell's attention off and on for a half-century, one of the results, the first demonstration by Mitchell and Reichert, in 1883, of the so-called toxic albumins, to which class belong not only the snake venoms but also certain plant, and especially bacterial poisons, being epochal. He further said the later classical researches of Flexner and Noguchi owed their inception to the inspiration and support of Mitchell, aided by grants from the Carnegie Institution.

The Civil War gave Mitchell opportunity to study nervous diseases on a large scale, and he seized it. He, Moorehouse and Keen studied in the military hospital many cases of all kinds of injuries of nerves received in battle. The material was such as only a great war can give, and he used it for the book, *Gunshot Wounds and Other Injuries of Nerves*, published in 1864. The work brought him scientific reputation, because it was a great book and solved not a few problems in neurology; in fact, no really important new clinical contribution to the symptomatology of disease of the peripheral nervous system has been made by anyone since, though much has been discovered concerning causation; our point of view as to disease in general has greatly changed, and surgical advance has tremendously improved treatment.

Among his minor discoveries were the cremasteric reflex and the disease erythromelalgia. His work on the relation of eye-strain to headache was of great practical value. In consequence of it many a victim of headache, unable to work and suffering from intense nervousness, has been relieved. A pair of spectacles has even cured a family quarrel and reunited man and wife. Unfortunately, as often happens, the medical faddist took up the matter and claimed to cure all kinds of illnesses by putting on glasses. Great harm followed. He studied the eye, not only in its therapeutic relation, but also was among the first of the American physicians to point out the great diagnostic importance of ophthalmoscopic examination in studying diseases of the brain.

His great popular reputation rested on the rest cure. In a little book, entitled *Fat and Blood*, he taught that tired nerves, states of nervous irritability, suspiciousness short of real delusions, terrible haunting ideas which terrify the victims, can often be cured by rest, isolation, massage, milk diet and the rest. He had the glimmering of an idea, which he could never prove, because chemistry was not far enough advanced, that milk does good in these patients not only because it is easily digested, but because it in some way alters the chemistry of the body. The future chemistry will probably prove the correctness of his guess.

There was at first much opposition among physicians to the rest

cure, especially from those whose temperament compels them always to be in opposition. We all know such people, by sad personal acquaintance; they are the type whose mental reflex is always "No," and who having once said the word, stubbornly persist in their opposition. They are the men who, when St. Peter meets them at the gates of Heaven on resurrection day, will hesitate, so fixed is their habit of opposition, to accept his kindly invitation to enter. Happily, no injury will be done, rather poetic justice, for they deserve to go to the other place. Some physicians, I fear envy influenced their subconscious minds, said it was unprofessional for a physician to write in language the common people could understand, because it was advertising himself, and he might thereby obtain a patient, and to have patients is wicked, because it means success. Others, horribly suspicious of the morality of their fellows, claimed that massage was immoral. The treatment finally, however, became too popular, and incompetent physicians used it on patients who needed a work cure, not a rest cure. Nevertheless, it still has, and will continue to have, a very important and useful place in therapeutics. It has brought back to healthy life many a nerve-wracked, brain-weary invalid.

A literary friend, one whose business is book-writing, said, in speaking to me about this address, "Of course you will only talk about the medical side of Dr. Mitchell's life," his tone implying that a mere medico was incompetent to speak on such a great matter as literature. In a sense, my friend was right. It would be presumptuous for me, a man without technical training, to pretend to be a serious critic of modes and methods, and to claim to be competent to speak with authority. I disdain to indulge in another kind of criticism, or investigation, though a certain type of professor of literature, thinking he is very scientific and being proud thereof, confines his attention to it. I mean the man who, lacking the art sense, as some are born color-blind, neglects the living soul of literature, dissects its dead body, its mere material and studies its mechanism as a mechanic examines a machine. This kind of man is illustrated by the teacher who gave to one of his post-graduate students in English literature,

as the subject for her thesis, "The Adjectives of Color and Sound in Shelley's Poetry." The dear, innocent seeker after a Doctor of Philosophy degree, dug and dug and dug, and catalogued, and wore out etymological dictionaries, and thought she was learning literature, but failed to see, so plainly was it before her, the very essence of the thing. Very soon, instead of finishing her thesis, she became, in consequence of her work, my patient; and after rest had cured her fatigue, a course in real literature, and I prescribed it, helped to make her a healthy woman, with an entirely different notion about the study of literature. The professor lost a pupil and a school for girls got a very good teacher, who is still without the Ph.D. degree. I wish such professors could all be compelled to sit at the feet of Quiller Couch, or else become professors of linguistics, a perfectly proper and useful science, but having nothing to do with literature. Again usurping the critic's seat, I had intended, in speaking of Mitchell's poetry, to say a few words about what is called, in free translation from the French, free verse, but recent events make me abstain, because I do not desire still further to disturb the already much perturbed emotions of the ladies who are carrying on the propaganda in its favor with a somewhat unnecessary violence of verbal and lachrymal effort. May I be permitted to say, however, that some of us (Mitchell was of the number) enjoy the other forms of poetry more. Mitchell did not use free verse, but then he was a minor poet, a poet of occasion, and he never rose to those great heights of passion or reached the arcanum of philosophy which can only be written about in broken prose. Seriously, poetic prose, with a cadence running through it, was not discovered only the other day and will continue to be written for a long while to come. But may we not ask the present-day leaders among the "free versers" to teach the less distinguished practitioners of the school to realize that thought is of some little value in writing, that noise, even musical noise, is not all there is in poetry. But, putting aside matters which only a few have a right to speak about, there are other aspects than the technical from which anyone who reads has a right to judge literature, to be a critic, because, after all, men of letters exist to give pleasure to the

rest of us. They are our servants, not our masters, and we have a right to say whether we are pleased or displeased, and why: and this is criticism.

We physicians are prone to boast about the number of our fellows who have achieved fame in literature. Really, if we throw out the men who studied medicine by accident and soon deserted it, the number is surprisingly small. In America, Holmes, who really eased practice early, though he continued to teach anatomy, and did it, I am told, charmingly but not ultrascientifically, and Mitchell, who practised until the end, are the only two great examples, though there have been many minor lights who got much pleasure out of letters. The number of American physicians possessing the genius for appreciation of literature is large; the number endowed with the genius of accomplishment small. This is curiously interesting, for if the ability to write were an acquirable faculty, dependent upon favorable circumstances and mere technical knowledge of people, the catalogue of men of letters would be full of the names of physicians, for no other class has the opportunity to see man in his nakedness, his strength and weakness, his ability to endure to the end, his frailty from the beginning, the play of motives in conduct and the variability of the moral sense. Every chief and every assistant in every hospital sees daily all the tragedy and not a little of the comedy of human behavior, but few perceive. This is the great reason so few medical men have attained high rank in literature. Furthermore, physicians have an unsuspected handicap. Their very knowledge of humanity, strange as it at first sight seems, limits them. Almost inevitably, when writing, they hold a clinic on good souls or bad; they cannot forget they are physicians; they are too painfully accurate in detail; they are too learned. Too much technical learning is a bad thing in literature. Had Shakespeare been learned in the schools he would not have been Shakespeare, but Bacon or some other of the same ilk. Mitchell wrote, not because his profession gave him large opportunity to study character, but because he was born with the faculty to perceive and sympathetically to understand, apart from professional knowledge, and

because he had the "urge" to accomplish. It is a great pity that more American physicians do not have literary instinct, because, even if they never wrote novels, drama or poetry, it would add to the interest and hence the value of their professional writings, as it did in Mitchell's case. All through the formative period of his medical life his professional reading was confined to the writings of English, the few Americans who were then writing, and French authors. Those men all believed that care in the use of words and clarity of expression are important in science; that science should be literature. Yesterday, as time counts in the lives of nations, we drifted away from such beliefs; tomorrow we may drift back. I fear, in any event, we will drift. I cannot hope we will knowingly wisely guide our course. The German men of science are largely responsible for our fall. One of the evil effects of German influence has been to make many of the younger Americans think a slovenly style, bad grammar and carelessness in the use of words, prove profundity of thought and a mind so active that it cannot be orderly.

I know not whether as a child, he, like so many imaginative children, wrote novels and plays to the astonishment of wondering parents, who so often think a mere outburst means that out of their loins has sprung a genius, only later to see the celestial fire burn out and leave behind the dead ashes of a very ordinary mind. I suspect he did, but in him the fire burnt on. When he felt the first impulse to literature, I also do not know, but he relates the following about his first work that brought pay. He says: "I never can resist telling a story. While this subject" (a discussion about amputation stumps) "was occupying my mind, a friend came in one evening and in our talk said, 'How much of a man would have to be lost in order that he should lose any portion of his sense of individuality?' This odd remark haunted me, and after he left I sat up most of the night manufacturing my first story, *The Case of George Dedlow, Related by Himself.* In this tale my man had lost all four limbs. I left this tale in the hands of a delightful lady, now long dead, the sister of Horace Howard Furness. Then I forgot it. Dr. Furness, her father, much amused, sent it to Mr.

Hale, editor of the *Atlantic Monthly*. To my surprise, I received about three months afterward a proof and a welcome check for $85, my first literary earning, and certainly not a contribution on my part, because I had nothing to do with the disposal of the paper, and had not authorized its being put into print. This story has had a dreadful number of successors, the product of my lengthening summer leisure. Some of them you may have read to your cost. The unfortunate George Dedlow's sad account of himself proved so convincing that people raised money to help him and visited the stump hospital to see him. If I may judge it by one of its effects, George Dedlow must have seemed very real. At the close of my story, he—a limbless torso—is carried to a spiritualist meeting, where the spirits call up his lost legs and he capers about for a glorious minute. The spiritualist journals seized on this as a new proof of the verity of their belief. Imagine that!"

He tells us somewhere that Oliver Wendell Holmes advised him not to go seriously into literature until his professional position was established, telling him if he did it would injure him as a physician, because people would say he had lost interest in his medical work. It is a curious fact that little-minded people are of fixed opinion that no one can have mind enough to do more than one thing. It is partly the result of unconscious envy and of the desire to deceive themselves into believing that no one can have more ability than they possess. The result of Holmes's advice was that Mitchell's first novel, *Hephzibah Guinness,* was not published until 1880. He was then fifty years old.

The medical man, the neurologist, shows little in his novels, save in the professional care, the clinical accuracy of description of certain bad, really diseased characters. *Constance Trescot* is the one in which most clearly the professional hand of the curer of sick minds is evident. The others could have been written—I am speaking only of his novels—by a man not a physician. I think his talent was for simple stories of common life rather than for analyzing the deep complexities of humanity, and this notwithstanding the fact that for many years he was busy constantly in solving and trying to solve the most complex problems in the

lives of many people. In *Hugh Wynne* he reached high-water mark. It is no common book, but a real romance, which holds the attention of the young, and in the work of attempting to Americanize the Americans going on today, much good would result if every boy of foreign parentage were given the book to read. Every youth would read it with pleasure and get his profit unconsciously. Such reading would teach true patriotism and would overcome much of the unwise psychology and sociology imbibed from the silly people who call themselves "the intellectuals." After *Hugh Wynne* I like best *When All the Woods Are Green* and *The Adventures of François. John Serwood, Iron Master,* is a remarkable book for any man to write when eighty-one years old.

Certain of his writings are a connecting link between science and literature. His literary instinct, quite as much as his scientific curiosity, led him to be interested in a group of subjects which are partly medical, but yet appeal to the romantic and poetic side of man. Hence, his papers on double personality, sleep and the strange things happening then, and the like. Such matters are not yet really within the domain of systematized knowledge, which is science, but appeal to the love of the mysterious within all of us.

Why has no medical man of letters ever succeeded in depicting the physician? None so far as I know has made a great attempt, and the lesser efforts have been mere literary thumb-nail sketches. I suppose the explanation is that no one can objectify his own class. A physician trying to analyze physicians is like a man writing his autobiography or painting his own picture looking in a mirror. Prejudice makes him see what he wants to see. Mitchell regarded George Eliot's "Dr. Lydgate" as the best-described physician in modern English literature. I fear he was right. Why I say fear, those of you who have read *Middlemarch* will understand, and if any of you are so modern as not to have read it, I advise you to do so at once. George Eliot's contemporaries came nowhere near her in picturing the physician. Even the great master, Dickens, many of whose characters have become types, known everywhere, to describe different sorts of men, failed to picture the physician.

Nowhere on his great canvases, filled to the very edge with men and women of so many kinds, does a physician occupy the foreground. His doctors are either mere caricatures or silly, sentimental, goody-goody men.

Mitchell had the gift of writing poetry for occasions, and in those poems his sense of real humor often appears. The man who can hold the attention of the overfed at a banquet while reading verse must be a real poet, and Mitchell was always able to do that. As pure poetry, I suppose, the "Ode on a Lycian Tomb" is his highest attainment. Personally, I like best to read his short descriptive poems of outdoors, his descriptions of lakes and rivers, mountains, storms and such primitive things. He loved outdoors, and wrote lovingly.

I must pass over his plays, confessing incompetence to judge.

Weir Mitchell had in smaller degree, and with a smaller stage to play on, smaller and fewer opportunities to act, the same zest for doing useful things characteristic of Benjamin Franklin. His most important public position was that of trustee of the University of Pennsylvania. He held the position for thirty-five years, and retired only when he had attained an age at which most men have long before, not only become food for worms, but part of the wind-blown and water-carried matter of the world. He had a share in the wonderful new birth of the University of Pennsylvania, carried on under the guidance of Dr. William Pepper. Though he was most active in the committee on the medical school, he was much interested in the work of all the departments. During his later life he saw the development of that feeling of dissatisfaction and unrest shown by teachers of a certain type and ending in the organized movement throughout the country for what they called the defence of freedom of academic teaching. Really no one in America ever thought of restraining the professorial tongue, whatever might be its vaporings, but these misguided gentlemen were determined to be martyrs and had a mental twist and very bad manners. Mitchell did not take the movement very seriously: indeed, did not take it seriously at all. So few people holding responsible professorial positions, or, for that matter, minor

teaching positions, took it seriously, partly, doubtless, because of the support it received from the parlor socialists and the sensational newspapers, much impotent rage arose within the hearts of the pedagogic knights fighting windmills of their own creation. The world has had such serious things to think about, and such important things to do in the last few years, and is so busy now saving these gentlemen from being hanged at the lamp-post by the real bolsheviks, that the movement has died a natural death and has not even had the ceremony of a formal burial. I speak of it because it was an incident, though a minor one, in the history of collegiate education which came somewhat into Mitchell's life.

He was for many years the guiding spirit of the Orthopædic Hospital and Infirmary for Nervous Diseases. He found it a mere dispensary; he left it a large and useful hospital. He studied in his clinics there patients who taught him much, and all his assistants, who worked with him, had a rare opportunity to learn not only medical facts but methods of clinical study: above all, how to examine patients. He was always interested in physical therapy, and several modes of treatment, such as massage, baths, the use of electricity, were introduced to the American profession or rescued from the charlatans by him while working there. Even at death his influence did not cease, for, through a magnificent gift from his long time and deeply devoted friends, Mr. and Mrs. Walter G. Ladd, added to by contributions, large and small, from people of all ranks in the financial scale, who loved him much and who wished to show respect to his memory, the out-patient department was given a well-equipped building of its own, separate and apart from the main hospital building

He was for years an active member of the Philadelphia Library and was a revivifying influence.

He was the first president of the Franklin Inn, a little club where men who love the humanities meet and talk, and used, in the wicked pre-prohibition days, even to drink a little—not too much, just enough. Originally it was intended for men who live by books, authors, and their enemies, the publishers; but once in a while they, by gross favortism, let down the bars and admit to membership mere book-lovers.

Mitchell did more for this College than any other man of his day and generation. He was elected to fellowship in 1856, and only one Fellow elected in the same year (Dr. J. Cheston Morris) survived him. He served as president from 1886 until 1889 and again from 1892 until 1895. From the time of his election to fellowship until his death his interest in this old society, with its traditions, its history, its wonderful library, one of the great medical libraries of the world, its sometimes too great conservatism, never flagged. His activity in increasing its usefulness was continuous. Through his efforts, and at the beginning his alone, were we enabled to leave the old barn at the corner of Thirteenth and Locust Streets and build this magnificent building. The proposal met with great opposition from a small group of timorous, fearsome and somewhat obstinate, but well-intentioned fellows, whose sincerity made their opposition the more difficult to overcome. Everywhere and always there are good men who are temperamentally against all change, all progress, all improvement, but I think dear old Philadelphians are greater sinners in this respect than any other group of mortals anywhere within reach of the sun's rays on this or any other planet. The College contained several. They said such a mass of books could not be moved, that Twenty-second Street could not be reached conveniently, and that we would be bankrupted. When Dr. Mitchell induced his friend Mr. Andrew Carnegie to give us a very magnificent sum of money for building, they said he was a multimillionaire, therefore wicked, and that we would be copartners in his sins if we accepted his tainted money Remember all this happened at the time the foul-mouthed and vile-natured "muckrakers" were in the ascendant throughout the country and had led honest and well-meaning but unintelligent people to have a false viewpoint about good morals. Finally, however, Mitchell overcame all opposition, and the result is a monument to his diplomacy, his untiring industry and his farsightedness.

Mitchell was from the first interested in the movement for instituting schools for training nurses. In his early medical life religious sisters were the only women who knew anything about nursing, and they, of course, had no systematic training. In most

hospitals the work was done by orderlies, often drunken, or by incompetent women. He had a large part in changing things and starting schools for nurses, until now some of us fear that possibly nurses may sometimes imagine they know more than doctors. Indeed, patients sometimes quote to me the medical opinions of nurses, but since, according to the new philosophy, no one is to have authority on any matter, especially not the specially trained, and no one is to be subordinate but everybody equal, this is to be expected.

One of the most important public questions he was interested in was animal experimentation. For years he fought to protect mankind from the assaults of fanatics. Some years ago a movement was started to protect animals from cruelty. It was an admirable idea and received well-deserved sympathy and encouragement. But soon men and women of a certain twist of mind came to regard animals as having rights equal if not superior to men and women. Becoming obsessed with the idea that physicians in general, and physiologists in particular, were by nature cruel, they soon determined to stop all experiments on animals. I should have stated first that sometime previous to this, very rapid increase in interest in physiology had begun and that this science depends fundamentally on animal experimentation. The antivivisectionists, as they call themselves, would have none of it, and becoming a well-organized and wealthy body have continued a crusade to stop all use of animals in scientific study. In addition to the zoöphilists, that large body of people, the intelligent public, who use as their life proverb, "Where there is smoke there must be fire," which though true in physics is not true in life, accepted the untruthful statements of the crusaders and increased the difficulty of having things done wisely. Mitchell and other men tried reasoning with these people. It was shown that thousands of children were snatched from death by the antitoxin treatment of diphtheria, the discovery and development of which depended wholly upon animal experiment. It was no use. The reply was, the doctors were lying about the results, and some disciples of the cult even said that it is wrong to kill a dog or other

animal even if thereby human lives are saved. Veterinary physiologists showed that animal experimentation saved the lives of thousands of cattle, sheep and pigs. The reply was the same, "It is wrong to experiment on animals." How long it will be before the matter is settled no man knows but fanaticism never finally wins. Historians of the distant future, however, when man has become a reasoning animal, will read with interest tinged with pity the emotional statements of the zoöphilists. Meanwhile, knowledge is delayed and mankind and animalkind alike suffer. There is hope that the tremendous good resulting from animal experimentation, as shown by the medical experience of the war just over, the young lives saved, the agonies of pain escaped, may so influence public opinion that eccentric people will have little influence on politicians, most of whom have had sons or brothers or themselves have been in the war. They have seen and have lived the realities of life. They will act accordingly.

He was a director of the Real Estate Trust Company, and when through the dishonesty of a trusted official that institution came to wreck, he, as was natural, acted the gentleman's part according to the gentleman's code.

Dr. Mitchell's industry was prodigious. Think of the variety of his vocations and avocations! His practice was very large, and one requiring not only much thought but also much diplomacy. Prescribing medicine was the smaller and, of course, the easier part. Teaching people how to live was the more important, required more skill and was the more difficult, because many patients want physicians to give them a physic which will, in some mysterious way, enable them to break nature's laws without paying nature's debt, not realizing nature is an inexorable taskmistress. It is true that for many years before his death he took long holidays from professional work, but earlier there was a long stretch of years when holidays were few and short. Physicians consider themselves very busy and very unusual if they do only this one thing—acquire a large and lucrative practice. But in his life it was only a part. In addition to private practice he, throughout his life, was a hospital physician. To him, as to every wise

physician, the hospital was a post-graduate school, where he was always taking new courses. He spent a great deal of time in the work of the numerous public bodies he was a member of. Hours that most men spend in pure idleness or in silly kinds of amusement, he passed in scientific or other work. Time left over in this busy life he gave to literature, his works numbering upward of twenty-five titles, of which fifteen were longer or shorter novels. There are many whose sole business is literature, the sum of whose work is not larger. Finally, with all this work, he found time to play, to get out in the woods and fish, in a real way commune with nature, and to enjoy the society of men and women Indeed, he found a great deal of time for social life, for he was instinctively a social animal and very gregarious. He was not one of those silent, brooding thinkers who live alone and within themselves, and then give to a surprised world their work, but a man requiring human companionship.

One secret of his having accomplished so much was very simple. He early learned the lesson that the mind is best rested not by doing nothing but by changing its occupation. Of course, everyone cannot take this prescription, for there are many whose minds are so little that they cannot find a multitude of interests, and hence can only rest by idleness; but many have large areas of mind, unknown to themselves, which could be worked productively if only a chance were given. Few men, even among those to whom nature has given the best mental machine, work unintermittently to full capacity. Some geniuses are able to do creative work only in irregularly recurring periods, the rest of the time doing nothing. We little people are all prone to follow the law of the labor union in mental work and only do as much, usually it is as little, as we must.

Destiny prevented Dr. Mitchell from becoming a teacher. This was a misfortune, not to him, but to the young men who studied medicine in Philadelphia during his working life, because it so greatly restricted his opportunity for personally influencing younger men. No man was kinder to young men whom he thought worthy of kindness. He was a mental stimulant to every young

man of intelligent ambition with whom he came in contact. He awakened intellectual industry, encouraged ambition and was helpful in all the ways that youth needs help. Now, as things were, the only young medical men who met him were his own assistants and the young instructors in the medical school. Had he been a teacher, and hence thrown with hundreds of young men, the lives of many would have been altered, not only for their own good, but for the betterment of the world.

Mitchell belonged to the mid-Victorian period, much abused today by the disciples of the new philosophy, by the people who think the world has changed, and who flatter themselves that they have had a large influence in making the leopard change its spots. They may have whitewashed it: some of us think they are black-washing it, but hope the first storm, the storm about to burst upon us now, will clean the wash off. His racial inheritance was British: his intellectual environment Victorian. He was influenced in literature by Wordsworth and Tennyson, and in some degree by Browning, by Scott and Thackeray and Dickens; in science by Darwin and the rationalistic naturalists; in medicine by that great group of English and French physicians who founded modern clinical medicine, who laid such stress on morbid anatomy and who founded rational therapeutics. Classical literature and thought played little part in his development.

He had all the terrible vices of the Victorians, those monstrous qualities that make the "uplifter," himself going, with a speed he knows not of, straight to the world's waste-basket of discarded notions, whine with impotent rage whenever he hears them spoken of. He did not believe in the racial and mental equality of men. He did not believe that all men can take education. He believed in democracy, the democracy of our fathers, whose wisdom founded representative government, but not in the rule of Demos. He distrusted Demos for its lack of intelligence, its emotionalism, its childish trust in every loud-mouthed political mountebank who pays himself high wages in good coin, and his follower, in promises bright as the rainbow and as unsubstantial; and because of its blood-lust, when its passions are aroused by those who call them-

selves the people's friends. He believed in government by law and not by men, by duly elected assemblies and not by momentary noisy heroes. He did not often talk on things political, but I remember well his deep, but quietly expressed, emotion, when that chief of wordmongers, W. J. Bryan—he who afterward, for our sins, was visited upon us as Secretary of State and settled affairs of great pith and moment in his intervals of leisure from his more serious work of appearing on the Chautauqua circuit between the yodlers and the fiddlers—ran for President.

He was fond of the forms and ceremonies of social life. It was he, for example, who was primarily responsible for the use of these not very comfortable gowns inflicted on the officers at the meetings of this society. He even believed that young people should say "Sir" to their elders, and I must confess, to my shame be it spoken, that when I was a man in middle life I called him "Sir" spontaneously, unconsciously, reflexly. But then my reflexes were firmly fixed before the new freedom was thought of; when we poor slaves, unconscious of our slavery, were taught, and believed the lesson, that he most respects himself who respects others.

He, like so many of the Victorians, indeed we find the quality rather common in all ages, realized his own worth and was very proud of it. Indeed, the little-minded dwellers in a one dimensional universe, those little souls who pass their lives within an intellectual world encompassed by the boundaries of a point and have no conception of a larger world without, leading their selfish, useless lives and denying the existence of a great outside world, inhabited by larger minds, accused him, when they could find no other fault, with vanity. In truth he was vain. I will go further, he was very vain. But it was a vanity that injured no man, in no way lessened his acts of kindness to others, in no way limited his good works. If the mental monads, his critics, had done one-tenth his work we would have forgiven them ten times his vanity.

A story told relates how another man had to confess sharing possession of this vice when speaking of Mitchell's vanity. Mr. Carnegie and Professor Blank were paying Mitchell a visit. Mitchell had been talking about himself, and when he left the

room for a minute Mr. Carnegie said, "He's got a pretty good opinion of himself." Whereupon the other, with a quizzing look and speaking slowly, said, "Do not you think that most men who do things think well of themselves?" Then Carnegie, after a moment, "Yes, I guess we do. Anyhow it is a human failing." It is the most human failing, and not to be counted against men who do things, but only against those who do naught in life but hunt for faults in their betters.

A story that Sir William, then Dr. Osler, told at the great banquet in New York given in his honor just before he left this country to go to Oxford, illustrates the importance of things social, of knowledge of how to behave, from the point of view of a Victorian. "Now," said Osler, "the authorities of the University of Pennsylvania, when they were considering my name for the professorship of clinical medicine, were easily able to find out about my intelligence, my learning and such things. But they, being wise men, wanted to know what manner of man I was: was I 'to the manner born?' They solved it thus. Dr. Mitchell gave me a luncheon. For dessert there was cherry pie, and, remember this, for it is the point, the pie contained the stones. The question was: Did I know what to do with the stones? I did." Ladies and gentlemen, the examination was more important than shows on the face of it.

The importance of manners from the point of view of the Victorians is well illustrated in an incident in my own life in which Mitchell had a part. When I was a very young man, he sent me one day to examine a patient for him. I, being modest, bashful, shy, was rather overawed when he told me that the patient was a very important old lady, rather irascible, very formal, and that I must remember my manners and make a good impression, because if I did she could and would be of great professional assistance to me; whereas if I offended her, she would forever use her tongue to my injury. After this sermon I was pretty well scared and approached her trembling within, blushing without, and with stammering speech. Her greeting was not cordial. At first I thought she was vexed that having sent for the great man his

jackal had come. Soon I felt it was more personal than that, that it was something in me had annoyed her. I went home crestfallen and sad. Next day, when I reported to Dr. Mitchell, he met me with the glimmer of a smile, and handing me a letter said, "Burr, read that." It ran: "Dear Silas! Never send that young man, reeking with tobacco smoke, to see me again." I stopped daytime smoking. The incident had a real Sunday-school-story ending. A year later I met the old lady socially and told her what a good turn she had done me. We became friends and she blew my horn until her death.

He did not believe that the man behind the gun is of any importance compared with the man who plans the gun. He believed in personalities and was himself a personality. He, being old-fashioned, did not believe in the identity of the sexes, and so far from believing in their equality, failed completely to comprehend how, under the mathematics of the new psychology, unlike things can be measured by the same units. This, of course, is a trifling detail we have gotten rid of by the simple process of putting it to one side. His opinion on the woman question is shown in the following quotation:

"What I shall have to say in these pages will trench but little on the mooted ground of the differences between men and women. I take women as they are to my experience. For me the grave significance of sexual difference controls the whole question, and, if I say little of it in words, I cannot exclude it from my thought of them and their difficulties. The woman's desire to be on a level of competition with man and to assume his duties is, I am sure, making mischief, for it is my belief that no length of generations of change in her education and modes of activity will ever really alter characteristics. She is physiologically other than the man. I am concerned with her now as she is, only desiring to help her in my small way to be in wiser and more healthful fashion what I believe her Maker meant her to be, and to teach her how not to be that with which physiological construction and the strong ordeals of her sexual life threaten her as no contingencies of man's career threaten in like measure or like number the feeblest

of the masculine sex." This is science, wisdom and, of course, therefore, truth.

Mitchell never retired from active life. He was spared that long period of partial physical death which sometimes precedes mental death: he was spared the very much more horrible and distressing thing that is the fate of many men, a long prodromal time of mental decay preceding the last blow of all which gives a tardy release from living. He endured to the end: his final illness was short. He almost had the thing all men should pray for, instead of praying to be spared from, a sudden death. The words he used in his address at the Centennial Celebration of this College in 1887 are appropriate to himself. He said: "As earnestly as our first President, I pray with him that all who sit around me, and all who are to come, do publicly and privately serve their generation." He, with great ability leading to great results, served his generation.

APPENDIX

PROCEEDINGS

OF THE

SECTION ON OPHTHALMOLOGY

MARCH TO DECEMBER, 1919

MARCH 20

Vernal Catarrh

Dr. Charles R. Heed exhibited a male, aged nineteen years, suffering from a chronic eye affection for thirteen years. No member of his family or friends have a similar affection.

The palpebral fissure was narrowed and a slight ptosis was present. The palpebral conjunctiva had a milky white tint, with a decided follicular hypertrophy, especially of the upper lids. No cicatricial tissue or bands. The bulbar conjunctiva at the limbus was thickened and spread over four-fifths of the corneal surface of each eye. The color was pale and the tissue had the appearance of a hyperplasia or thickened conjunctiva, with a number of new bloodvessels.

Dr. Edward A. Shumway said that he had shown a case of vernal conjunctivitis of the palpebral type before the Section in January, 1918, which had been cured by the application of radium, and had subsequently reported two successes before the Section

on Pediatrics of the Pennsylvania State Medical Society in September, 1918. The applications had been made by Dr. Pancoast at the University Hospital, large doses, from 35 to 40 mg., being used, at intervals of three or four weeks, according to the ensuing reaction. In one case, in which the radium had been left too long in one position, there had been a burn of the conjunctiva, which gradually disappeared. In none of the cases treated had there been an involvement of the bulbar conjunctiva or of the cornea, as in the present instance; but he thought radium might be employed in Dr. Heed's patient, probably in smaller doses, and he advised its trial. He asked Dr. Heed whether a search had been made for eosinophiles in the conjunctival discharge, as their presence would be in favor of vernal catarrh as against trachoma, to which the condition bore some resemblance in the case shown.

Dr. Zentmayer said the mechanical ptosis and the thickened appearance of the lids, with a somewhat gelatinous infiltration of the conjunctiva of the upper lid, together with the unusual hyperplasia of the limbus and cornea, suggest that the case may belong to the class of cases reported by May, of New York, of mixed trachoma and vernal conjunctivitis. The case is very similar to one shown before the Section some six to eight years ago by Dr. Posey.

Multiple Dermoids of the Eyeballs, with Other Developmental Anomalies.

Dr. Wm. Zentmayer showed photographs of a woman, aged thirty years, with symmetrical dermoids of the sclerocorneal margin, with a dermoid of the cornea of the right eye. The sclerocorneal growths were about the size of a white bean, of chamois color, pultaceous in feeling and presented several cilia projecting from the surface. The corneal tumor was somewhat conical, yellowish-white and projected between the lids. There were well-marked supernumerary auricles on each side of the head

and there was a very marked megalastomia. The right eye was converged about 80 degrees. Marked scoliosis placed the heart on the right side of the spinal column.

At the first operation the sclerocorneal dermoids were removed, and about ten days later the corneal growth was dissected off. Two weeks later the right external rectus was advanced and the internal rectus tenotomized. Later the supernumerary auricles were removed and the oral fissure was closed to a point to make the mouth symmetrical. The obliquity of the mouth could not be corrected.

Retina Supplied Entirely from the Ciliary Circulation

The patient was a colored woman. In the right eye there was a large cilioretinal artery which emerged at the upper border of the papilla and at $1\frac{1}{2}$ d. d. from the disk bifurcated, one branch going to the temporal fundus, the other to the nasal. A second large one emerged at the lower outer border of the disk and almost immediately divided, both branches supplying the inferior temporal region. A third came out at the lower inner border and bifurcated at $1\frac{1}{2}$ d. d. from the disk. Both branches supplied the inferior nasal fundus. A small cilioretinal vessel came off at the middle of the nasal margin of the disk. All the vessels had the characteristic crook, bending back on the surface of the disk before being distributed to the retina.

Cyst of the Iris

J. M., male, aged twenty years. Seen at Wills Hospital February 28, 1919. He comes on account of attacks of blindness in the right eye. The first attack was in June, 1917, while caulking. Vision was reduced to L. P. c., which lasted a couple of days. Vision recovered completely but halos have persisted. No pain. Between this time and February, 1919, the interval of attacks

was about six months. Since the latter date they are almost constant, there being but slight intermissions. Family history negative. A "spot" had been noticed in the R. E. since early childhood. Vision: R. E., 6/9 pt.; L. E., 6/6 pt. T. R. E., 30 mm.; L. E., 20 mm. Field, R. E., slight irregular contraction, with a reëntering angle below.

R. E. Iris light hazel. Cyst chocolate brown. Mass is 4.5 mm. by 3.5 mm. and fills the angle of the chamber from the outer border of the sphincter to the ciliary border. It is dome-shaped with the convex border above. The borders are rounded and cast a shadow on the iris. The surface is smooth except for a slight thickening of its anterior surface near its base.

The larger circle of the iris is greenish gray in temporal segment but is hazel in its nasal half. The anterior chamber is deep; the iris reacts well to light. The fundus is normal.

Under the use of pilocarpin vision has increased to 6/6 pt. and T. = 22 mm.

The case belongs to the idiopathic type of iris cysts. The pathogenesis is obscure, but they have been explained as arising from a blocking of an iris crypt. Some sort of surgical interference is indicated. Either the surface of the cyst wall may be excised or an iridectomy including the growth should be done The latter would seem to be the surer operation.

Ocular Motor Palsy as a Sequel to Influenza

Dr. Zentmayer related the histories of three cases for the purpose of bringing the subject before the Section.

A. K., aged twenty-eight years, physician. Seventeen days ago taken with slight headache, general muscular weakness and hyperesthesia of the left side of the chest and the right side of the face. Three days later developed diplopia. Two days ago weakness of the right side of the face and nystagmus.

There was paresis of the right external rectus and nystagmoid movement of the eyes, especially marked in looking to the left.

Weakness of the entire seventh nerve. The fundus and fields were normal.

W. H., aged thirty-one years, male, stock broker. He was seen in consultation with Dr. Maxwell Langdon. Four days ago he began to feel heavy and drowsy. For this he took fractional doses of calomel. Two days later he found difficulty in focussing. No diplopia. Vision normal. Homonymous diplopia behaved as in paralysis of divergence. L. H. 3 degrees.

The third case was that of a young woman, seen at Wills Hospital, who had a paralysis of the right external rectus.

In all of the cases the symptoms were recovered from in short time. In all there had been an attack of influenza which had been apparently recovered from. Lethargy was not present in any of the cases.

Dr. Zentmayer did not think that any of the above cases could be considered as belonging to the type occurring in various parts of the world and to which the term lethargic cephalitis has been given.

Dr. Edward A. Shumway said that many of the members present must have been struck by the number of ocular palsies which had been appearing of late, and he reported in some detail six cases, in one of which there had been a history of influenza, but in the other five no such history was obtainable. With the exception of the postinfluenzal case, they had shown marked drowsiness, in some instances stupor. The oculomotor and abducens nerves were the most frequently affected, and in two the facial nerve was involved. In one of the latter the sympathetic fibers were apparently disturbed, as there was narrowing of the palpebral fissures, widening of the pupil and a slight enophthalmos on the paretic side. One patient had died at the end of two weeks, respiratory failure and high temperature appearing just before death, although the ocular paralyses had been clearing up. Unfortunately no postmortem examination could be obtained. In three cases there was decided disturbance of speech, the patients talking in a slow, drawling manner. In one instance the Wassermann test was positive, but the suddenness of the onset with fever

seemed to warrant the placing of the case in the same class as the others. They must be considered as a polioencephalitis, and apparently closely resemble the cases of "lethargic encephalitis" which have been described in epidemic form in England, France, Germany and Austria during the past year. Similar cases have been seen in various parts of this country, notably in New York, Chicago and Baltimore, so that the epidemic is evidently spreading here and more cases are to be expected. Whether they have any relation to the influenza outbreak is as yet unsettled, but we have evidently to deal with an acute, probably infectious process involving the centers in the neighborhood of the corpora quadrigemina and extending downward in some instances into the pons and even into the medulla.

Dr. S. Lewis Ziegler said that the discussion so far had not noted the fact that paralysis of the external muscles of the eye may have a local peripheral origin, such as exposure to cold or a draft striking the eye. This is on a par with cases of Bell's palsy arising from exposure to cold weather when the patient sleeps in the open after a debauch. Three cases of paralysis of the external rectus consulted Dr. Ziegler within a few days of each other, each giving the history of sleeping in a draft during a spring night when the weather suddenly changed from a high temperature to a low one. All of these cases yielded to the combined galvanofaradic current, two recovering after one month's treatment and one after three months.

Silver Wire Arteries

Dr. Charles R. Heed exhibited a male, aged fifty years, presenting marked changes of the retinal arteries of the right eye. Physical examination disclosed a chronic pleurisy, emphysema, enlarged heart and a general arteriosclerosis. Blood Wassermann negative.

Fundus O. D.: Disk pale; margins irregular and exudate covering surface; veins were moderately dilated and tortuous;

arteries showed sclerotic changes of an advanced state; temporal vessel appeared as a solid white line. The other arteries appeared as chalky white lines with a central blood column. O. S.: Disk margins clean; color pale; retinal vessels show no gross changes.

Dr. Zentmayer said the retinal arteries in Dr. Heed's case were not "silver wire" in the sense in which this term is usually applied, that is, they do not show hyalin thickening but rather a perivasculitis. This in connection with the enlarged veins, the atrophy of the nerve and the connective-tissue formation on the surface of the papilla suggested that the case was one of post-neuritic atrophy.

APRIL 17

Bilateral Congenital Entropion

Dr. Wm. Zentmayer presented an infant upon whose eyes he had performed an operation for congenital entropion of both lower lids. The removal of a crescent of skin with a few of the underlying fibers of the orbicularis had been sufficient to cure the condition. Mayou states that these conditions are never true entropion but a malposition of the cilia. In this case the margin of the lid was rolled in also, so that the cilia were turned down into the cul-de-sac. It may, therefore, be properly termed congenital entropion.

Marked Congenital Pigmentation of the Sclerotics

Dr. Wm. Zentmayer showed R. C., aged eighteen years, a Russian Jewess. Each eye presents a broad interrupted zone of pigmented sclera reaching from within a few millimeters of the cornea almost to the equator of the globe. The pigment is blotchy and varies from light to dark slaty gray and in places brownish, probably due to the presence of capillaries, as the

instillation of adrenalin causes it to lose the brownish color. The skin of the lids is dusky and the veins dilated and dark. The skin of the face shows linear pigment stripes. There are disseminated areas of "port-wine" nevus over the entire body with the exception of the right arm and foot. The ocular fundus has a dark steel-gray hue. The patient is the oldest of five children. None is similarly affected. She has good teeth and has broken no bones. The condition is a pigmented nevus of the sclerotics.

Possible Asteroid Hyalitis

Since sending in the title, Dr. Zentmayer has become convinced that the case is really one of uveitis with disciform opacities in a mesh of exudation. The appearance being similar to a dotted veil. There is a patch of exudative retinochoroiditis in the same eye.

Dr. Holloway stated that he agreed with Dr. Zentmayer that the present opacities were those sometimes seen in cases of severe uveitis. Since the publication of his previous report he has seen three cases of these snowball vitreous opacities, the details of which will be published later.

Congenital Unilateral Ptosis Operated upon by the Motais Method

The case was reported to emphasize the value of the Shoemaker modification of Motais's operation. The child was aged five years, and the superior rectus so frail that the difficulties of the procedure would have been unsurmountable had not the open method been used. The result is not perfect but is very good.

Note on the Use of Ethylhydrocuprein

The case presented had been one of severe pneumococcic traumatic ulcer, 7 mm. in diameter, with hypopion. Vision = L. P. The treatment consisted in the use of ethylhydrocuprein, ice

compresses and atropin. The result was a corneal scar not as large as the original ulcer and vision = 3/60. Dr. Zentmayer's faith in ethylhydrocuprein strengthens with his experience. Any bactericidal agent to be effective must be, as far as practical, constantly in contact with the organisms. His method of using optochin is to have a 1 per cent. solution dropped into the conjunctival cul-de-sac every two hours during the day and every three hours during the night, and to have the ulcer touched with a 2 per cent. twice daily. A local anesthetic should be used before each application.

A Case of Buphthalmos: The Results of Four Posterior Sclerotomies and an Optical Iridectomy on Each Eye

Dr. Luther C. Peter exhibited P. V., aged seventeen months, who was shown at the Section about a year ago. Briefly the history at that time was as follows:

The child had a condition of buphthalmos at birth. The corneæ were both very large, blue and the centers of the cornæ were occupied by marked white opacities and granulations. It was pebbly in appearance, with marked juvenile arcus. The anterior chambers were very deep and the iris indistinctly visible through the cloudy corneæ; pupils dilated to about $4\frac{1}{2}$ mm.; tension of the eyeballs about 35 mm. The scleras are bluish white in color.

Family History. The parents are Italians, second cousins; one other child, an older brother, is suffering from the same disease and is totally blind, enucleation having been performed on one eye. There are five other healthy children.

Myotics were used the first six months without any apparent improvement. At this time posterior sclerotomy was performed on the right eye without any untoward symptoms and was followed by a marked clearing of the cornea. Subsequently at intervals of two months repeated posterior sclerotomies were

performed, four on each eye, followed in each instance by marked clearing of the corneæ, which, however, had a tendency to relapse. By this series of tapping the posterior chamber the tension of the eyes has been kept at about 25 mm. of mercury. Because of the cloudy media the child was developing lateral nystagmus. Optical iridectomies were therefore decided upon and a small section of the iris was removed at the outer limbus in the right eye and the inner limbus in the left eye as the areas in the corneæ offering the best visual results. Very little reaction followed these operations, and the child now is able to see objects fairly small, and the nystagmus has practically disappeared.

The results obtained from this method of treating the patient are satisfactory up to the present time. (1) The corneal opacities were decidedly lessened after each posterior sclerotomy; (2) the tension of the eyeballs was held at about 25 mm. of mercury; (3) the optical iridectomies have decidedly improved central visual acuity and have practically removed the nystagmus which was rapidly developing. The child is kept under observation, and should the tension be increased further, posterior sclerotomies will be performed. One cannot say what the ultimate prognosis will be in this case as the results of the surgical procedures, but the visual results and the general improvement at this time are very satisfactory.

Dr. Zentmayer thought that Dr. Peter was fortunate in the result obtained. From the opinion expressed by many of the ophthalmic surgeons of America it is evident that any operative procedure to be of value must be done early. He recalled that Dr. de Schweinitz had reported successes with posterior sclerotomy, and Dr. Zentmayer believed that, except in the very earliest stage of the disease, this was the only justifiable procedure.

Dr. Holloway stated that in examining this child he had noted that there occurred some reflex sneezing. In his experience this very frequently occurred, and he referred to two children at the Overbrook School for the Blind where this was present to a persistent and excessive degree upon the slightest attempts of the patients to open their eyes. There was intense photophobia in

each case. He thought it worth while to comment upon this, not because he regarded it as peculiar to this particular affection, but simply because it is frequently associated with it.

Dr. de Schweinitz stated that his attention had been directed by Haab's recommendation to the value of repeated sclerotomies in the treatment of buphthalmos. He briefly referred to two cases treated by corneoscleral trephining, the operations having been performed not by himself. Certainly in these two cases apparently there was temporary benefit, but he was unable to relate the ultimate outcome of the operations.

An Unusual Case of Perivasculitis

Dr. Luther C. Peter showed Mrs. A. J., colored, aged sixty-one years, housekeeper, who complained that her sight began to fail about three years ago. Her present ocular condition is as follows:

Vision in the right eye is 20/200 and in the left 20/30. Arcus senilis is marked in both eyes; pupils 3 mm., equal in diameter; react to light and accommodation. Eye-grounds: Right eye pupil is oval, long axis, 90 degrees. There are a few fine lenticular opacities and a few floating masses in the vitreous. The disk is 16 x 18 mm.; long axis, 90 degrees, well defined, excepting at the upper and outer border; edges somewhat obscured. The veins are overfilled and tortuous; arteries are tortuous and light streaks are for the most part absent. The superior temporal branch of the central artery shows a marked perivasculitis. It consists of a broad ribbon-like perivascular tissue through which a narrow column of blood is visible here and there. About 3 d. d. from the disk the vessel and its branches disappear in a retinal haze, but appear beyond in bifurcations, which are surrounded by narrow borders of white. The terminal branches are exceedingly narrow and tortuous and the macula branch, which is derived from the superior temporal artery, is also a solid mass of white tissue and is lost in a hazy macula area. This temporal vessel, including the macula twig, is at least twice the size of the

other branches of the central artery in the neighborhood of the disk. Surrounding the macula is a beginning stellate figure which is regarded as diagnostic of the so-called "albuminuric retinitis." Beneath the macula are a few minute round hemorrhages. Other parts of the fundus show moderate retinal haze and edema and evidences of arteriosclerosis. There are no hemorrhages. The perivasculitis is distinctly confined to the superior temporal branch.

The left fundus is similar in appearance to that of the nasal half of the right retina, characteristic of the fundus usually found in chronic interstitial nephritis.

The fields in each eye show the characteristic contraction for form and color. In addition to this concentric contraction there is a quadrant area of blindness down and in. This quadrant is almost lost for form and totally lost for red, and in a small area to the nasal side of the field the green test object is recognized as white.

The patient shows a generalized arteriosclerosis. The urine is of low specific gravity and contains an occasional cast and albumin. The blood Wassermann is negative. The clinical medical diagnosis is that of chronic interstitial nephritis, with marked cardiovascular changes.

The case is of unusual interest both because of the limitation of the perivasculitis and the superior temporal branch of the right eye, and also because of its very pronounced appearance and the abundance of the perivascular tissue. As to the immediate etiological factor, embolic or thrombotic processes can be safely eliminated. The condition undoubtedly is a perivascular change, arteriosclerotic in origin and associated with chronic interstitial nephritis.

Dr. de Schweinitz agreed with Dr. Peter that the vascular changes in his patient were not the result of an embolic process, and thought they represented lesions in association with arteriosclerosis and nephritis. He assumed that the influence of syphilis had been eliminated. He described a case of extensive retinal vasculitis and perivasculitis in a colored man which he had

reported, and which was almost certainly due to syphilis, and referred to the fact that it had seemed to him that such vascular changes were apt to be more pronounced in the colored than in the white race.

Sudden Loss of Vision from Acute Sphenoiditis, with Complete Recovery

Dr. H. Maxwell Langdon presented the history of this case because of the three cases reported by Dr. D. T. Vail in the *American Journal of Ophthalmology* for February, under the title, "Monocular Retrobulbar Optic Neuritis from Hyperplasia of the Ethmoid Bone." Dr. Langdon's case was very similar to them except that the sphenoidal sinus was involved instead of the ethmoid. Mrs. M. B. W. was first seen on January 23, 1917, with the following history; she had had grip, with much pain around the right eye and brow for the preceding ten days. O. D. vision blurred the past two days.

Externally the right pupil was 4 mm.; no reaction to direct light, but a good consensual response. The left pupil was 2.5 mm.; good direct reaction; no consensual reaction. Each acted well to accommodation. The ocular rotations were full in all directions. O. D. vision. Fingers at one foot. O. S. vision 6/10. The media were clear; the right disk somewhat hyperemic with blurred nasal margins; the left disk was normal; there were no other fundus changes. The right field was gone except for an irregular light field, and the left field was normal except for a slight contraction for colors.

Dr. G. B. Wood examined the nose and found no evidence of sinus involvement except some slight congestion of the right middle turbinate; an *x*-ray investigation made by Dr. H. K. Pancoast was negative except for some clouding of the left antrum.

Later, Dr. Wood again examined the nose, and after applying cocain to the right ostium sphenoidalis there was a sudden improvement in vision, the patient seeing the pattern on the floor covering. Dr. Wood then removed the posterior end of the right middle

turbinate and drilled a small hole through the front wall of the sphenoidal sinus without finding any pathological secretion. The vision improved with washing of the sphenoid, until on the tenth day after the first operation the vision was 6/15, and with no treatment other than nasal. The disk hyperemia disappeared and there were no further complications, corrected vision being 6/5.

That this was an involvement of the optic nerve from a sphenoidal sinuitis seems beyond all doubt, and yet there was no pathological secretion on tapping the sinus and no shadow on an *x*-ray plate from a cloudy content of the sinus. It seems there must be a form of involvement which gives a clear secretion, at least in the early stages, for this case was attacked as soon as the vision was disturbed. It opens up an interesting point as to whether Dr. Vail did not have something of the kind involving the sphenoid rather than hyperplasia of the ethmoid bone.

Dr. de Schweinitz briefly discussed a case of acute retrobulbar neuritis which had been examined and described by Dr. W. R. Parker, where there had been sudden improvement in vision after the free use of adrenalin in the nasal chambers, which had apparently started drainage and thus relieved pressure on the optic nerve. He questioned whether negative *x*-ray examinations and investigation of the nasal chamber in the sense of failure to find purulent secretion were sufficient to exclude the presence of some types of ethmoiditis which might be the cause of optic nerve changes. He referred to the fact that unilateral intraocular as well as retrobulbar neuritis were strongly suggestive of sphenoidal or ethmoidal infection.

Hypopyon Ulcer of the Cornea Treated by Chauffage

Dr. H. Maxwell Langdon related the case of W. M., who was first seen February 2, 1919, with the history that on February 22, while digging a street excavation, a piece of asphalt struck him in the right eye, since which time the eye had been sore. The eye was slightly injected, and there was a corneal ulcer, about 3 mm.

in diameter, slightly to the upper, outer side of the pupil. The ulcer was touched with carbolic and a bandage was applied, the pupil dilating readily with atropin. The ulcer spread slightly, but was checked by further carbolization, though the center would not heal and there was steady increase of the hypopyon until the lower half of the anterior chamber was filled, and it was determined to try the effect of radiant heat. A galvanic cautery was heated until a thermometer held over it registered 145° F., and when held below the cautery registered 125°; as the eye was below the instrument, this is the temperature applied, the eye having been thoroughly cocainized. It was held as close to the eye as possible, avoiding contact, for a minute, then away for three minutes, during which time the eye was irrigated with salt solution; the application was repeated twice at the same sitting. In twenty-four hours the hypopyon was beginning to absorb, the iris at the lower outer portion of the anterior chamber becoming visible. The improvement was uninterrupted until the hypopyon is now entirely absorbed and nothing remains but a moderately dense scar near the center of the cornea, due probably as much to the repeated use of carbolic acid as to the heat. Had the heat been used sooner it seems most likely that the scar would have been much less.

This heat was applied, of course, after the method described by Weekers, and not in the way Shahan advises, one of his thermaphores not being available.

Dr. de Schweinitz, although he had had no personal experience with Dr. Shahan's thermophore in ophthalmic practice, referred to reports he had received of its value in the treatment of infected corneal ulcers in the service of U. S. General Army Hospital No. 14, at the time of the report in charge of Dr. Meyer Wiener.

Dr. Holloway stated that he regarded Dr. Langdon's result with chauffage as excellent, but he felt that it was worth while emphasizing the important work which had been done in this country by Shahan in placing the application of heat to the eye upon a somewhat more scientific basis. Unfortunately, Shahan's instrument was not available at the present time, and until this

could be secured it would be necessary to use some of the other methods, which while they doubtless give satisfactory results are by no means as accurate in determining the actual degree of heat applied.

OCTOBER 16

Unilateral Exophthalmos with Bilateral Ophthalmoplegia and Beginning Bilateral Neuritis

Dr. Wm. Zentmayer showed the following case: M. B., aged ten years. About three weeks ago there was sudden "swelling" of the right eye, with pain over the eye, lasting for one week. There was some vomiting and occasional diplopia during the first week. She has had measles, chicken-pox and whooping-cough. No convulsion or injury.

The right eye was proptosed 7 mm. and there remained only a very slight upward rotation of the eye. Pupil 4 mm. Left eye very slight upward, downward and inward movements. Pupil, 3.5 mm. Both eyes turned to the right. Face carried to the left and up.

R. E., 6/6 pt. L. E., 6/5. Illit.

R. E., upper-inner border of papilla prominent. Veins greatly dilated and tortuous. L. E., upper-nasal border of p. veiled. Sup. n. v. enlarged.

X-ray of sinuses and head negative. Wassermann and tuberculin test negative. Several conditions were considered: cavernous sinus thrombosis, posterior ethmoiditis, growth in the anterior portion of the brain pushing down the roof of the orbit and invading the oculomotor centers.

The absence of venous stasis, thrill and bruit was against, and the presence of unilateral exophthalmos with bilateral involvement of the muscles and optic nerve were for cavernous sinus thrombosis.

The apparent suddenness of the exophthalmos without previous

symptoms of any kind, with a stationary condition, was against a neoplasm. The probable cause was cavernous thrombosis. An exploratory incision will be made to determine whether there is an orbital condition.

Dr. Rhein, who made the neurological examination, believes the diagnosis rests between acute external ophthalmoplegia and cavernous sinus thrombosis.

Proliferative Chorioretinitis with Partial Avulsion of the Optic Nerve

Dr. Zentmayer presented an adult male, who five years ago suffered a self-inflicted pistol shot wound of the head. The bullet entered the skull on the right side, just above the zygomatic arch, behind the external orbital rim and passing through both orbits lodged in the anterior fossa of the brain, where it remains. The fundus of R. E. shows a mass of new-formed connective tissue overlying the position of the disk and extending upward several dd. and forward into the vitreous 5 or 6 D., the lower and temporal borders are rounded and there is a broad band of similar tissue extending out toward the temporal region. There is considerable pigmentation of the borders and surface of the mass. Emerging from the edge of the mass and curving about its rounded border at several points there were vessels, some of which were new-formed, others the vessels of the retinal circulation.

On the left side there was a complete ptosis and paralysis of the external rectus. There were the sequelæ of iridocyclitis. V. = L. P. A Tansley-Hunt ptosis operation was done to relieve the patient of the adhesive strip he had been wearing to elevate the lid.

Different interpretations of the fundus picture might be given, but Dr. Zentmayer considered it to be a proliferative retinochoroiditis, with partial avulsion of the optic nerve. Similar cases are reported and pictured in Lagrange's and also in v. Szyli's atlases of *Fundus Lesions of War Injuries.*

Dr. Holloway stated that this patient had been seen by him several years ago in the dispensary of another institution. At that time the right eye was blind and presented the enormous areas of organized tissue that have just been described by Dr. Zentmayer. The position of the disk could be determined by the vessels curving toward it, although the tissue covered them for some distance below the disk. When first seen the patient saw hand movements with the left eye. With the ophthalmoscope only a faint pinkish reflex could be obtained down and out and large floating masses could be seen which were regarded as a probable detachment of the retina. Much to his surprise, during the course of the next six months, this eye cleared up to such an extent that he acquired 1/15 vision and certain fundus structures could be vaguely seen. At the present time the vitreous has again become much involved and presents the appearance not unlike that which was noted at the time he was first seen.

Dr. Holloway stated that he had seen two other cases of similar gunshot wounds, in one case both eyes being destroyed.

Foreign Body in Sclera

Dr. Wm. T. Shoemaker and Dr. Hunter W. Scarlett (by invitation) presented the case of a male steel-worker from Ohio, who was struck near the inner angle of the left eye by pieces of case-hardened steel, September 19, 1919. The shop physician saw no evidence of a foreign body, and as the vision was good, he declared the eye uninjured. Patient resumed work, but a few hours later complained of pain and blurred vision. The following morning the lids and conjunctivæ were edematous. After reëxamination three pieces of steel were removed from the lower cul-de-sac by means of an applicator.

One week later the diagnosis of intra-ocular foreign body was made and the patient was sent to Canton for magnet extraction. The doctor in Canton localized a foreign body in the upper part of the eyeball, applied the magnet without result and told the

patient that it was non-magnetic. He was then discharged, with instructions to return to work and disregard the pain.

The patient then came to Philadelphia and consulted Dr. Scarlett, October 4. *X*-ray at the Lankenau Hospital showed a small foreign body embedded in the lower temporal portion of the sclera. External examination shows a pin-head sized perforation of the iris, 1 mm. from the pupillary border, about 9 o'clock, and a stringy horizontal opacity in the upper cortex of the lens. With the ophthalmoscope the F. B. can be seen as localized. There is a raised area of choroidal disturbance and a tiny detachment of the retina.

The vision of the eye is 20/50. The giant magnet was tried to its capacity. The traction caused a good deal of pain, but was not sufficient to liberate the F. B.

Here then was an eyeball with a piece of steel embedded in the sclera, which would not yield to magnetic persuasion. The damage done by transit of the foreign body was comparatively little and the eye is quiet and has a high degree of usefulness.

In Dr. Shoemaker's opinion further attempts at extraction are not indicated and the eye can safely be let alone. There was a time when he demanded the foreign body or the eye, but to take both in this case seems to be, at the present time, unjustifiable.

Dr. Holloway stated that the appearance of the fundus at the site of the foreign body reminded him very much of three cases he had seen a number of years ago. In making these remarks he had no intention of reflecting upon the accuracy of the *x*-ray examination that had been made of Dr. Shoemaker's case, but he merely wished to point out that he regarded accurate localization in such cases as necessary before ultraradical procedures were adopted. He then referred to one case in particular in which this same picture had been caused by choroidal pigment, which had been regarded as the foreign body until an accurate localization demonstrated that the piece of steel was immediately behind the sclera. He also pointed out that under such circumstances, where the wound of exit is in the macular region or near it, a stellate figure may be formed having the same appearance as a stellate figure seen in cases of nephritis and brain tumor.

A Note on Cyclodialysis

Dr. G. E. de Schweinitz, after a brief description of Heine's operation and the usual indications and results, referred to a case of subacute glaucoma in a man whose other eye was blind. The tension was very high, above 60 mm., the cornea steamy, and there was a persisting conjunctivitis which, on examination, yielded a pure culture of Staphylococcus pyogenes aureus. Miotics reduced the ocular tension but did not control it. A peripheral iridectomy, or corneoscleral trephining, or Lagrange's operation, seemed to invite disaster in the presence of such an active staphylococcus conjunctivitis. After as thorough cleansing of the conjunctival sac as was possible a cyclodialysis was performed, and immediately the small scleral incision cauterized with carbolic acid. The chamber deepened, there was no reaction of any consequence, miotics were continued, and at the time the patient was exhibited, nearly five months after operation, corrected vision was 6/9, the field had markedly widened, and the tension as measured with the Schiotz tonometer was 18 mm. Thus far it had not been found necessary to repeat this operation or to perform any other one. It would seem, therefore, that, even though it might prove of only temporary benefit, cyclodialysis followed by cauterization of the scleral incision was worth trying in conditions such as those described.

In a second case, in a Hebrew woman, the right eye was blind from staphyloma, the left eye in a state of advanced subacute glaucoma, with steamy cornea, obliterated anterior chamber and vision reduced to shadows; on both sides there was dacryocystitis; the canaliculi had been slit. Tension was very high; it was not possible to measure it accurately with the tonometer. After a course of miotics, which reduced somewhat the tension, a cyclodialysis was performed, exactly as in the preceding case. As soon as the spatula was withdrawn the anterior chamber was, although shallow, reëstablished. Within several days the tension was lowered, to about 30 mm. Subsequently it began to rise, the cyclo-

dialysis was repeated, with the same good result, and since then, a few weeks only, however, it has remained normal and vision satisfactory. Treatment of the duct has checked all discharge, and cultures are free from pathogenic organisms. It is proposed now to try either a corneoscleral trephining or else a sclero-iridectomy. Dr. de Schweinitz suggested that cyclodialysis in cases of practical obliteration of the anterior chamber and very high tension should prove to be a useful procedure preparatory to a more formal operation, in place of a posterior sclerotomy.

Dr. Zentmayer said when cyclodialysis was introduced he performed a series of operations on various types of glaucoma. On the whole the immediate results were good. As the operation seemed more adapted for the preservation of sightless glaucomatous eyes and for secondary glaucoma with marked sclerosis of the vessels as in retinal hemorrhages and thrombosis of the central vein the operation was later limited to such cases. It seems particularly well adapted to the second class. As has been pointed out again by Dr. de Schweinitz, the reduction of tension produced by the procedure is sometimes delayed for forty-eight hours, or, in other words, it comes on so slowly that often no noticeable reduction occurs within this time.

Dr. Holloway stated that over a year ago a patient had come to him with a glaucomatous eye, with vague light preception and practically complete obliteration of the anterior chamber. Doubting whether a cyclodialysis or a posterior sclerotomy would be of avail in securing any appreciable depth to the anterior chamber, he trephined the sclera well back from the corneoscleral junction between the superior and external rectus and carried a narrow knife into the vitreous chamber. The tension was somewhat reduced for eight or nine days and there was a very slight deepening of the chamber, but the results were not permanent. He mentioned this case at this time, in the hope that others might try the same procedure in suitable cases.

A Note on the Treatment of Hypopyon Keratitis

Dr. de Schweinitz reported the case of a workman, about fifty years of age, who came with advanced hypopyon keratitis of some weeks' standing, following a slight corneal injury. The hypopyon filled three-fourths of the anterior chamber, and above it there was a small abscess within the corneal layers. Cultures from the ulcer yielded a pure return of "diphtheroids;" no pneumococci or streptococci were present. The usual treatment, curettage, cauterization (trichloracetic acid), ethylhydrocuprein, dionin, iodoform dusting, etc., failed to check the disease. Fifteen hundred units of antidiphtheritic serum were injected. Within thirty hours an improvement was noted, further stimulated by additional serum injections. All the ocular pathological conditions subsided (atropia was constantly used and frequent boric acid irrigations, but nothing else), and at present (some months after the treatment) the eye is quiet, the cornea, however, partly covered with leukoma.

Dr. de Schweinitz, referring to the notably favorable effect of the antidiphtheritic serum in this case, spoke of the recommendation which had been made by Darier, Fromaget, Zimmermann and other observers, of its use in infected corneal ulcers, and discussed some of the views which had been expressed in regard to the pathogenicity of xerosis bacilli in certain circumstances and of the relation of these bacilli to pseudodiphtheritic bacilli. He doubted if the ulcer in the case reported had been the result of the "diphtheroids," which probably should be regarded as a secondary and without definite etiological significance. He felt, however, in view of the results in this case, and in one of the recent cases which he briefly reported, and in view of other observations to which he had alluded, that trial of this serum in cases of infected corneal ulcer not yielding promptly to the usual measures, including autogenous vaccine therapy, should be made. He had not employed in this case thermotherapy, either by Weeker's method or with the thermophor of Shahan.

A Case of "Petit Mal" Benefited by a Proper Glass Correction

Dr. P. N. K. Schwenk related the case of M. T., aged thirty-four years, who was referred to him in September, 1918, with a history of having convulsions in infancy, while teething, followed by *petit mal* until her fifteenth year, when nocturnal convulsions began. She was then put on "bromides." For eighteen years (during the latter fifteen years of which she has worn glasses) she has had *petit mal* attacks and convulsive nocturnal seizures each month ten days before menstruation. For ten days after menstruation she is usually free. The attacks are preceded by an aura, a sensation in the spine between the scapulæ rising to the back of the head.

For six years she had frequent pains over the left eye and in the occipital region. No loss of bladder control.

Her malady and the constant bromide medication made it impossible for her to concentrate her attention long enough at a time for her to study to any advantage, and so she left Bryn Mawr College without graduating.

So for eighteen years she has been depressed, gloomy and fatalistic, unable to carry on any line of work or realize her ambition. During these years she has taken bromides, in moderately large doses, twenty-six days out of each month. She came to Dr. Schwenk on September 2, 1918, wearing:

Rt.—2.75 S = + 5.25 cyl. axis 90°.
Lt.—2.00 S = + 5.25 cyl. axis 80°.

Cornea and pupils normal; apparent parallel fixation; muscular movements normal; eye-grounds negative. Findings under a mydriatic (Duboise) were:

Rt.—20/c − 2.50 Sa + 4.00 cyl. axis 100° = 20/20 − 2.
Lt.—20/cc − 3.25 Sa + 5.50 cyl. axis 80° = 20/20 − 2.

Orthophoria ordered:

Rt.—2.75 ⌔ + 4.00 cyl. axis 100°.
Lt.—3.50 ⌔ + 5.50 cyl. axis 80°.

She has worn this correction since September 6, 1918.

On December 13, 1918, Dr. Schwenk had the following report: The glasses relieved the left supra-orbital and occipital headaches at once. She soon found the ordinary usual doses of bromides made her unusually sleepy and began to reduce them with considerable trepidation. Her last major attack was September 6, 1918. She ceased taking bromides December 1. Has menstruated since and has had no attacks. She feels less depressed and can read or sew for several hours without trying her attention.

For eighteen years—although she had occasional provocations—she could not weep, as there were no tears. Recently she has been able to weep.

The improvement is unquestionably due to the proper refraction, as she dates her betterment from the day she put on her new glasses.

An Improved Method for the Total Enucleation of the Eyeball

Dr. Frederick Krauss suggested an operation consisting of a complete dissection of the conjunctiva only to the fornix. The lateral muscles are caught by penetrating sutures of catgut and attached to the opposite Ténon capsule, as in the advancement operation, after the eyeball has been removed.

The vertical muscles are similarly caught but attached to the neighboring Ténon tissue. The capsule of Ténon is carefully dissected free from the eyeball and the optic nerve cut in the usual manner.

After Ténon's capsule and the ocular muscles are attached as above stated the conjunctiva is separately sewed at right angles to the wound of the capsule.

The resulting stump is excellent, allowing as free a movement as in the gold ball implantation with the severe reaction after operation entirely eliminated.

NOVEMBER 20

Operation for Drainage of Lacrimal Sac

Dr. Harris P. Mosher, of Boston, read by invitation a paper describing an operation for draining the lacrimal sac and the nasal duct into the unciform fossa. Since this paper does not lend itself readily to abstract form, readers are referred to the article in full, which appears in the *Laryngoscope*, vol. xxv, p. 739.

Dr. S. Lewis Ziegler said that the ingenuity and practicability of Dr. Mosher's operation should receive our commendation. There is no doubt that a patulous tear duct can be secured in this way. West's window resection operation and Yankauers's operation also accomplish this result. There is, however, a certain physiological drawback in all these operations. The normal capillarity of the lacrimal canal is interfered with and forcible regurgitation of septic secretions cannot be prevented when the nose is blown. This fault was also present in the older technic of extreme dilatation so frequently repeated that atrophic degeneration of the lining of the overpatulous tear duct finally occurred. Many years ago he saw two extreme examples of this latter method in which infection of the cornea, perforation and emptying of the anterior chamber would occur overnight. This accident was liable to happen at any time, and was repeated many times while the patients were under his care. Strange to say, these ulcers were clear and left but slight traces of the process, while the vision was but little disturbed.

Excision of the lacrimal sac has not proved as successful in cases of dacryocystitis as one would like to see. He had several times been called on to do corrective operations where slight infection of the wound and subsequent contraction of the scar had caused a mild ectropion. This he corrected by his galvanocautery puncture operation. In other cases in which the epiphora proved annoying he performed rapid dilatation of the atresic lacrimal

canal, *pro forma,* as though no previous operation had been done, and then introduced a lead style for the tissues to heal around, somewhat like the metal ring inserted in the perforated lobe of the ear when planning to wear earrings.

Dr. Ziegler still believes that rapid dilatation of the lacrimal canal *ad maximum* and without incision of the tissues is the best treatment for the great bulk of obstructive lesions of the tear duct. He recently saw two young ladies, aged twenty-one years, for whom he performed rapid dilatation (up to No. 12) when they were about two weeks old. Examination showed a physiologically patulous tear duct, permanently preserved.

He had the opportunity of seeing a number of Dr. West's operative cases when he was working in the clinic of Dr. Silex, in Berlin. He could not see that the results were better than with rapid dilatation. But he did come to the conclusion that whatever the treatment used in order to correct the lacrimal lesion a skilled rhinologist is required to coöperate in order to improve the ventilation of the upper air chamber, the drainage of the sinuses and the hyperesthesia of the nasal mucosa. In this way only can the chemically irritating and bacteria-laden hypersecretions be reduced to a normal and non-irritating condition and the physiological balance between the nose, tear duct and eye be restored. The hyperesthetic area over the septal tubercle is the "eye spot" of the nose. By sympathetic reflexes it controls the sinus secretions. Cauterization of this area will therefore greatly reduce all such hypersecretion.

Dr. Zentmayer said it was very disappointing to learn that after the intranasal operation, as described by Dr. Mosher, probing at irregular intervals over an indefinite period is necessary to maintain drainage. It may be said, for the operation of excision of the sac, that when the procedure has been properly done, treatment of the condition is at an end. It is true that, for a time, in most cases, the epiphora following the operation is annoying, but this gradually lessens and in most cases finally ceases. If after the intranasal operation probing is still required he saw no advantage in doing the operation, and believed it would gain but few advocates.

Dr. G. Oram Ring expressed the conviction that no intranasal operation of the West type or its modifications would ever entirely take the place of lacrimal sac excision—notably in those cases of chronic lacrimal disease associated with cataract or corneal ulceration. Dr. Ring recalled a visit to the Silex Clinic, Berlin, which he made during 1912, at which time it was rare not to see several cases of extirpation of the sac daily. A visit to the same clinic two years later found Dr. West doing his operation at the same clinic largely to the exclusion of all others.

The method at that time was on trial, but the conviction was expressed by most of the nose and throat men connected with the Berlin Polyclinic that the nasal opening made was not likely to be permanent. They insisted on waiting at least a year or two before giving their approval to the procedure.

Excision of the Lacrimal Sac

Dr. Posey said that Meller's publication of his bloodless method for the removal of the lacrimal sac had converted that operation from a most unsatisfactory one to one of the most satisfying and interesting operations in ophthalmic surgery. He said he deviated but little from the precise directions laid down by Meller, substituting a 2 per cent. solution of novocain for cocain as being less toxic and making use of an ordinary hypodermic syringe instead of the Pravaz instrument.

Dr. Posey makes the internal palpebral ligament a valuable guide, realizing that he will find the sac lying directly beneath it. He dwelt upon the importance of the removal of every piece of diseased tissue connected with the sac, also of a thorough curettement of the canaliculi. The scarring observed several months after the operation is negligible.

Dr. Posey advocated the removal of the sac in all cases in which there is a mucopurulent discharge from the sac and in all mucoceles in which pressure fails to squeeze out the contents of the sac either into the nose or the conjunctival cul-de-sac; also of all

infected sacs prior to any operation which necessitates an incision into the globe; also of all cases of neoplasm or suspected neoplasm of the sac.

The results of the operation, in so far as it removes the source of the irritating and annoying discharge into the conjunctival cul-de-sac, are usually very satisfactory. Tearing, after psychic or mechanical irritation of the lacrimal gland, is the most patients complain of, and this varies according to the nervous susceptibility of the individual.

Dr. Posey said he had never had recourse to removing the lacrimal glands to relieve this lacrimation, the watering of the eye generally subsiding after a time, so that it annoyed but little. Dr. Posey said that while removal of the sac gets rid of the diseased structure, it does not restore the lacrimal apparatus to its normal condition. Indeed it annihilates for all time the excretory mechanism. Any operation, therefore, which opens up the lacrimal passages and maintains them in a patulous condition, should be given a fair trial, and he proposed in the future to refer suitable cases to rhinological colleagues for a trial of Dr. Mosher's procedure.

A Note on the Pathologic Histology of Excised Lacrimal Sacs

Dr. G. E. de Schweinitz said that extirpation of the lacrimal sac is an operation of ancient lineage. Celsus recommended that the sac should be removed down to the lacrimal bone, which was subsequently touched with the point of a glowing iron. The same operation was commended by Galen and by Paulus of Aegina, both of whom declare that many surgeons in its performance bored through the os unguin into the nose, the ancestor, perchance of those operations which in our day establish an intranasal drainage. Berlin, in 1868, gave the first impetus, in comparatively modern times, to the operation of extirpation of the lacrimal sac, now commonly and successfully practised in many suitable cases.

His experience with this operation was a fairly large one and from it he concluded:

1. It is a good operation if its technic has been correct.

2. For a week or two the epiphora may be annoying; subsequently it markedly lessens, and sometimes practically disappears, unless the patient is exposed to wind or irritants.

3. The lessening of the epiphora does not depend upon atrophy of the lacrimal gland, but upon the disappearance of the irritation to which this gland had been subjected prior to the extirpation of the sac by infectious conjunctival secretion.

4. According to C. R. Holmes there is no serious objection to removal of the lacrimal gland in the event of continuance of annoying epiphora, and none to ablation of the palpebral portion of the gland, which is not without value in these circumstances.

5. Extirpation of the sac is of less favorable result in children than in adults, and adaptation is quicker in those patients who prior to the operation have had complete stenosis of the duct, and in whom the overflow of tears has been correspondingly great.

The pathological findings in excised lacrimal sacs have been often recorded. A personal research in this regard made some years ago confirmed other observations of other surgeons, referring now to various types of so-called chronic dacryocystitis. In general terms the excised tissue exhibits some form of chronic catarrhal inflammation of the sac or else acute hemorrhagic and purulent inflammation. The results of a number of these examinations may thus be summarized:

The epithelium lining the sac may be intact over its surface, but upon it are exudations of leukocytes or marked leukocytic infiltration between the cells; the mucosa is usually densely infiltrated with small round cells, sometimes massed, with eroded and degenerated epithelium over them. The fibrous coat of the sac usually shows intense injection of the vessels with hemorrhages adjacent, and areas of embryonic connective-tissue formation. In the lymph spaces of the fibrous coats the endothelium may be thickened and proliferated.

Examination of the periosteum, as in a fragment recently

removed in these circumstances, shows fibrinous and hyalinized connective tissue, vascular engorgement and profuse lymphocytic infiltration, which is especially marked in the perivascular regions.

Perfectly willing to be convinced that other methods than extirpation of the sac are more satisfactory, and some of the intranasal operations hold forth fair promise, it was difficult for Dr. de Schweinitz to believe that anything but a radical removal of tissue diseased as it exists in chronic dacryocystitis is entirely satisfactory. Certainly in certain ophthalmic conditions it became almost obligatory, *e. g.*, to aid in the treatment of serpent ulcer of the cornea and to render safe operations on the ocular bulb when the sac is inflamed and pus-secreting.

DECEMBER 18

Persistent Pupillary Membrane

Dr. P. N. K. Schwenk showed a case of persistent pupillary membrane in a girl, aged fifteen years; born in Russia; came to this country when eight years old. Personal and family history negative. The patient had measles in infancy and scarlet fever at the age of seven years. About four years ago, while attending school, she first became aware of trouble with her eyes, but was thought only to be near-sighted. Glasses were first prescribed for her at the City Hall in this city. She was reëxamined each year following, but innocently consulted fake optical clinics. Her last pair of glasses were shop glasses obtained one year ago. She came into Dr. Schwenk's clinic at the Wills Hospital in November, 1919, complaining of poor vision, pain in both eyes after reading or writing and excessive lacrimation, conjunctiva nothing unusual. On first general examination cornea and pupils appeared normal. A mydriatic was ordered, and under mydriasis the pupils were somewhat irregular, but unlike that due to posterior synechia. In the right eye there are three distinct bands attached to the

smaller circle of iris, brown in color and crossing the pupil to opposite side, and adherent to lens capsule in pupillary area, giving an appearance of a brown membrane on lens, almost covering the pupillary area. Left eye has four bands crossing from side to side nearly at right angles, giving a brownish membrane appearance on lens capsule. In addition several fine filaments can also be seen. Right eye vision 20/200 S. — 2.50 = 20/70. Left eye vision 20/70 S. — 3.00 = 20/50. Dr. Schwenk feels justified in attempting to remove the capsule or membrane at the risk of having to do a curettement of lens.

A Case of Burn of Both Eyes by a Salt of Copper

Dr. Howard F. Hansell reported the case of W., aged fifty-five years, who, while manipulating a powder of which the composition is uncertain, but known to contain a salt of copper and ammonia, was severely burned in both eyes and face by an explosion. Almost the entire conjunctiva and cornea of each eye were covered with a blue, smooth layer of foreign substance. The summit of each cornea was free, the substance having been wiped off by winking, but the pupillary area was infiltrated and slightly opaque in the anterior layers. The layer of copperas was easily removed by a wisp of cotton, not, however, without carrying with it the epithelium.

The features of interest are the destruction of anterior layer of both eyes by chemical action rather than by necrosis from contact with intense heat, and the prolonged and only partial recovery. For two months destruction and regeneration of the epithelium succeeded each other, because of disturbance in the function of the pericorneal vessels, the corneal lymph spaces and the terminal nerves of the cornea.

Occlusion of the Macular Artery by Endarteritis Obliterans

Dr. Luther C. Peter reported the case of a young man, aged twenty-three years, who has recently been discharged from the

service as sound. Five weeks ago vision in the right eye suddenly became blurred. Two days later, when he presented himself at the Polyclinic Hospital, the patient presented the following condition:

Pupils equal, reacted to light and accommodation and convergence. Fundus examination of the right eye showed an opaque gray area to the outer side of the disk, including the macula. The macular twig was completely occluded. A second macular artery was seen to traverse the upper border of the opaque area and to pass on to the temporal part of the retina. The disk was somewhat hazy; arteries and veins were somewhat indistinct because of the vitreous opacities. The veins in the periphery of the field were dilated and tortuous. Fluffy white masses floated in the vitreous in the neighborhood of the disk. Field studies showed a cecocentral scotoma, with contraction for form and color fields. Wassermann was feebly positive.

Two weeks later the fundus picture was somewhat changed The ischemic area in the macula was more sharply defined; the vitreous opacities were coarser and the deposits on Descemet's membrane were visible. Field studies showed a central scotoma for form, for green and red and an enlarged blind spot of Mariotte for these same colors. There was, however, a larger scotomatous area for blue, including both the macula and Mariotte's blind spot. Peripheral fields were about the same as when first examined, with the exception of the blue field, which was almost as small as that for green.

The diagnosis was endarteritis obliterans, with occlusion of the macular twig and partial occlusion of the central artery of the retina Attention was called to the relative infrequency of embolism of the central artery of the retina and its branches, and particularly to an isolated occlusion of the macular artery either from embolism or thrombosis. The enlarged scotoma for blue and the contraction of the blue field relatively greater than that for red and green was indicative of involvement of the choroid, the contraction of the blue field being an early evidence of nutritional disturbance of the neuro-epithelial layer of the retina.

An Unusual Form of Proliferating Retinitis

Dr. Peter showed an unusual form of proliferating retinitis in a young woman, aged twenty-eight years, whose history was entirely negative as to injury either at birth or subsequently. The patient discovered accidentally six years ago that her right eye was bad. Vision in this eye is 2/200, vision in the left eye 20/20.

Three distinct pathological changes were present in the eye-ground: (1) Atrophy: There was evidence of atrophy of the temporal half of the disk, the macular twigs being very small, and there was also some contraction of the central artery of the retina. (2) Central choroiditis: A rather large atrophic area surrounded by pigment was observed below and including the macular region and extending toward the disk. In addition there was some mottling of the retina immediately around the disk. (3) A band of proliferating retinitis: This consisted of a regular, diaphanous ring, bluish gray in color, about the width of the central artery of the retina. This ring began below the disk, passed around it in an oval fashion about one disk diameter away from it above, then finally terminated down and in, blending with the surrounding retina. This ring was delicate, distinct and anterior to all the retinal vessels and slightly undulating below, where it was best observed with +4 D. It was not so well defined as the proliferating bands usually observed after trauma.

The author felt that the ring was the result of an injury probably received at birth or in early childhood and represented a tearing away either of the anterior limiting membrane of the retina or of the posterior limiting membrane of the hyaloid body, the edges of which had undergone a proliferative process and, therefore, had become visible with the ophthalmoscope. In the author's experience this case was unique.

Coloboma of the Macula

Dr. L. F. Appleman presented a case of bilateral, symmetrical coloboma of the macula, which was seen in Dr. Holloway's clinic at the Wills Eye Hospital.

Vision had always been poor, especially in the right eye, which showed exotropia. When first seen her vision was: R., 6/60, L., 3/60.

The ophthalmoscope revealed a lesion in the macular region of each eye about one and a half disk diameters in size, with clearly defined edges and excavation amounting to about three diopters. The whole surface showed considerable pigmentation. The retinal vessels could be traced across the affected area. The optic disk in the left eye was atrophic but in the right eye was of good color. The peripheral portions of the retinæ were normal. The Wassermann reaction was negative.

Exophthalmos with Bilateral Ophthalmoplegia

Dr. Wm. Zentmayer made a further report on a case of exophthalmos, with bilateral ophthalmoplegia. The patient was shown at the October meeting. Shortly after this a slight redness of the skin of the lid was noticed and palpation for the first time caused pain. There was also some spontaneous pain. There was a high leukocytic count. An incision was made into the orbital tissues along the supra-orbital margin near the outer canthus and about a dram of pus was liberated. Motility of the eye on the opposite side to the exophthalmos was restored at the time of complaint of pain. Since the drainage of the pus the exophthalmos is slowly receding, the neuritis has subsided and the movements of the eye are increased. From the facts that there was not a continued flow of pus and that the pointing occurred at the outer canthus the probability is that the condition was one of periostitis.

Some Recent Observations in Asthenopic Eyes

Dr. S. D. Risley read a paper on "Some Recent Observations in Asthenopic Eyes," the full text of which appears in vol. iii, p. 356, of the *American Journal of Ophthalmology*.

Dr. Howard F. Hansell said it was difficult for him to understand the reason for Dr. Risley's statement that the visibility of this ring is possible only with the retinoscopic plane mirror armed with +2 D. If the ring is a deposit on Descemet's membrane it should be seen with the aid of the loop or by indirect examination. If it is only a shadow near the periphery of the cornea and due to lack of uniformity of curvature of the center and periphery its relation to uveitis is not clear.

He will take the first opportunity to look for the ring and hope to be able to verify, by his own experience, Dr. Risley's interesting discovery.

Extensive Sclerosis of the Choroid

Drs. T. B. Holloway and A. G. Fewell (by invitation) reported the history of a man, aged fifty-three years, who came under observation at Dr. Holloway's clinic at the Wills Hospital. He stated that he had had poor vision since childhood, but that he could read fairly well until twenty-six years ago. Since that time the vision has been much reduced, so that only large objects could be recognized.

The patient has a high myopia, but he has not been able to secure satisfactory glasses. There is no history of consanguinity. The patient has four brothers living, all of whom have poor vision, and four children living and well, and but one wears glasses. Two children are dead, one dying at the age of sixteen from pulmonary hemorrhage. He states he has always enjoyed good health and he has been temperate in his habits. His general physical examination failed to show anything of consequence aside from excessively bad teeth, with marked pyorrhea. The nasal examination showed marked deviation of the nasal septum, with some enlargement of the turbinates. The Wassermann test of the blood was negative.

In each eye the vision is reduced to counting fingers at two feet. The ocular adnexa are normal, corneæ clear, anterior chambers rather deep, and pupils react normally. The tension of the right eye is 27 degrees and of the left 24 degrees. The intra-

ocular examination of the right eye shows delicate posterior central lenticular disturbance, with scattered pinpoint opacities and punctate vitreous changes. The disk is markedly atrophic, with a large excavation. Extending from the disk well out beyond the macular region and to the midzone above and to the nasal side below there is a widespread sclerosis of the choroidal vessels. In this area all degrees of vascular change may be noted from delicate white vascular markings to complete fibrosis. In the extreme periphery there are also marked evidences of sclerosis, but not to the same degree. Both sets of retinal vessels are contracted to a minimum, the arteries being only threads. The left eye shows delicate central posterior opacities with slight linear scratches, also punctate vitreous opacities. The disk shows advanced atrophy with large excavation on the temporal side. To the temporal side of the disk and involving the macular region there is the same tendency to uniform fibrosis of the fundus structures as has been described for the right eye. The area of excessive changes on the nasal side above and below is not quite as marked as in the fellow-eye. Scattered about the periphery and central portions can be noted discrete but small clumps of pigment. The retinal vessels show the same excessive contraction.

J. Milton Griscom, M.D.,
Clerk.

PROCEEDINGS

OF THE

SECTION ON INDUSTRIAL MEDICINE AND PUBLIC HEALTH

DECEMBER 3, 1919

The Food Supply of Philadelphia

BY SENECA EGBERT, A.M., M.D.

In addition to expressing my appreciation of the honor conferred upon me by your Committee on Public Health and Preventive Medicine in the invitation to report to you upon the food supply of this city; I also wish to thank its members for the most interesting and instructive experience that has been the resultant of that invitation. So far as I am aware such a survey has not heretofore been made in Philadelphia, and possibly not in any other large city in this country. Hence it has had all the attraction of a new and unworked field; and while what I have to say to you tonight is in the nature of a summarized and abbreviated statement of the more extensive report which I hope to make later to your committee, I wish to disclaim any thought that I have exhausted the subject or covered all of its many phases.

In carrying out my work I have tried to secure as much first-hand information as possible, and so must acknowledge my indebtedness not only to the officials, Federal, State and Municipal, of whom I shall speak later, for their helpful assistance, but also to the owners and managers of the many large and important establishments, which I have had the pleasure of visiting and inspecting, for their generous welcome and willingness to give me helpful information and coöperation.

The first striking impression that I received after fully entering upon the work, and one that has not been in any sense dispelled

as I continued, is the enormous quantities of food of all kinds that continually go to supply the consumption of the city and its environs; for it must be remembered that a considerable part of what daily passes through our wholesale markets and supplying agencies ultimately finds its consumers in the many communities surrounding the city.

This is one reason why no definite figures for the respective quantities of most current commodities excepting milk can be given. But there are other reasons, and even so careful a student of Philadelphia's statistics as our friend, Mr. Cattell, the City Statistician, has confessed to me his inability to determine the exact measure of our food supply.

Nevertheless the feeling grows upon one that it is like a great river, receiving increments from many sources and tributaries that individually may vary from day to day, but which collectively and continually keep the main stream at full flood to meet the needs of our people.

Secondly, and even more insistently, came the appreciation of the excellent quality of almost all of the great bulk of supply as it comes to the general distributing centers and agencies from its many and varied sources.

To state that the food collected here for distribution to the public by the jobber and retailer is in quality 98 or 99 per cent. good is, I am sure, no exaggeration, and I am upheld in this opinion by my friends, the inspectors of the City, State and Nation, to whom must be given credit for the constant maintaining of this quality at its present high standard. To properly handle and conserve the enormous supply, and yet maintain its quality, means extensive coöperation, constant energy and good business efficiency on the part of wholesalers and commission merchants, backed by the vigilance, firmness and fairness of your official representatives whose business it is to inspect the general supply and ensure its purity.

Just here it may be well to explain the role of the respective agents concerned in this official supervision. All firms or establishments whose food products or supplies are materials of interstate commerce come under the control of the Federal inspectors, who

represent the national government through the Bureau of Animal Industry of the Department of Agriculture. In other words, any concern here which manufactures or deals in food products of which a part is to be sold in another State or country is under Federal control. Thus we have active in this city and vicinity eighty-two of these officials, of whom the local chief is Dr. C. A. Schauffler.

The State representative is Mr. Robert P. Simmers, who, with his assistants, is entrusted with the duty of securing and maintaining the observance of the statute laws of Pennsylvania as they pertain to food and food supplies.

Lastly, the supervision of local markets, stores, milk supplies, slaughter houses, etc., as far as sanitation and the requirements of municipal ordinances are concerned, devolves upon the city inspectors, who are attached to the Bureaus of Milk Inspection and Meat Inspection. Thus the work of each of these three branches of authority interlocks with the others and jointly tends to secure a measure of protection sufficient to make the purity and quality of our food supply what it is.

Philadelphia's advantageous location has much to do with her excellent food supply. As a nearby neighbor to the great trucking areas of New Jersey, Delaware and Maryland, and to some of the richest agricultural counties of the nation comprised in our own State, she has an unending abundance of fresh vegetables, milk and other farm products at her doors; her nearness to the ocean and great lakes secures a full quota of fish and sea-food; and her qualifications as a railroad center and port assures a constant delivery of every variety of food material from even the most distant points of the globe.

Few of us realize the extent of this great daily inflow of edibles. For example, on every week-day morning, long before most of us are up and about, from 80 or 90 to 200 or even 250 carloads of fruit and vegetables are sold at the big wholesale market on 30th Street between Chestnut and Market, for here is where most of the produce that arrives by rail is received. A little later in the morning there begins another big distribution at Dock Street,

where the multitude of farm wagons and motor trucks from the truck farms of New Jersey and of our own neighboring counties come with their loads of fresh and appetizing material. We have other receiving centers also at 2d and Callowhill, 2d and Berks and other places in the city; many farm supplies are received directly at the larger retail market houses, and no one can tell how many farm wagons and trucks bring their loads directly to provision merchants or private customers scattered throughout the city. Meanwhile, milk is coming in to the extent of more than half a million quarts a day, and meats, fish, butter, eggs, cheese and almost everything else that is edible are arriving by train-load and ship-load to supply the demand of our appetites.

From October 1 to 10 there were received 257 car-loads of apples, 197 car-loads and 38,800 additional baskets of white potatoes and 192 car-loads, 54,200 baskets and 1175 barrels of cabbage. Likewise, on last Monday, December 1, we received 1878 tubs of butter of 75 pounds each, 3129 crates of eggs, each containing 30 dozen, 46,856 pounds of domestic cheese and 71,886 pounds of dressed poultry. If these figures are not impressive enough, let me add that from March 1 until December 1 inclusive we have received 550,280 tubs (41,271,000 pounds) of butter, 1,480,275 crates (44,408,250 dozen) of eggs, 18,834,501 pounds of cheese and 15,328,274 pounds of dressed poultry. And practically all of it was good, for it had to pass Federal or State inspection.

What the city needs and uses from day to day, coming as it does not only from all parts of this country but from every country of the world, could not possibly be supplied directly from the multifarious sources and with the supply automatically adjusting itself to the ever-varying demand. Consequently, great storage warehouses in which the incoming food may be safely stored and later distributed through seasons of non-production have become a necessity for all large communities. I have had the privilege of visiting several of those in Philadelphia and found them to be in an excellent state of sanitation and cleanliness, and with careful attention given to the proper conservation of the various kinds of food consigned them. To many the term "cold storage" brings

suggestions of stale and unwholesome food, and possibly also of unlawful profiteering, and I must confess that when I first saw thousands of crates of eggs, together with tons of beef, fish, butter, etc., stored in room after room and floor upon floor of these great buildings, I could not help feeling that the high cost of living would receive a serious and perchance fatal blow if these accumulations were promptly and rapidly thrown upon the current markets.

But coming as I have to appreciate the enormous daily food consumption of the city, I can assure you that these great storage reservoirs, as they may be truly termed, are an essential feature of the wise and conservative distribution of food, and that without them we would experience alternating periods of feast and famine with respect to many of the perishable and most important necessities of life, and with such corresponding fluctuations in price as would demoralize and discourage all business in them and more than occasionally place some of them beyond the reach of many.

It may be true that consignments which are already unfit for food are sometimes received and kept in these warehouses, or that food supplies that have been in "cold storage" may for varying reasons be in a far from wholesome condition when offered to the consumers. Freezing does not convert a rotten egg into a fresh one nor make decomposing meat any the less objectionable or more wholesome when it is again thawed out. But, barring rare and unavoidable accidents, the bad conditions of the food cannot fairly be attributed to its retention in these great warehouses. Simply as a matter of good business policy and common sense it is to the interest of their managers to keep what is consigned to them in the best of condition and every care is had to maintain the correct temperatures for the respective articles stored in them and to observe all sanitary and other reasonable precautions. Storage rooms and corridors are kept clean and orderly and are evidently whitewashed at frequent intervals, so that it is difficult to see how any serious damage could occur to the stored foodstuffs, especially when the constantly maintained low temperatures are also considered.

As an example of what this storage factor amounts to in the big

problem, there were, according to the report of the Federal Bureau of Markets, in cold storage here in Philadelphia yesterday, December 2d, 2,347,487 pounds of butter, 134,485 crates (4,034,550 dozen) of eggs, 2,356,652 pounds of cheese and 1,219,132 pounds of dressed poultry.

Before passing to the discussion of the distribution of the food to the ultimate consumer from the wholesale or commission merchant by way of the jobber and retailer, it may be advisable to consider some of the staple articles of food.

One of the chief of these is milk, for not only is the quantity consumed large, but its quality probably more directly affects the health of a large proportion of the city's population, especially the young, than any other foodstuff.

Every hour of the day and night milk is moving on its way to Philadelphia from the thousands of farms in this and the neighboring States, some more than 300 miles distant, and with a shipping time of half a day or more. Consider, if you will, the constant care and effort involved in maintaining supervision over the herds and the places from which the milk is primarily procured, in keeping the quality of milk up to the legalized and commercial standards, in securing prompt and reliable shipments and proper care in transit, and in so handling and conserving it here at its destination that the consumer will be assured of a product essentially clean, pure, safe and of the highest quality. I think you must admit that we have here the essentials of a great business organization and one of paramount importance to the community.

According to information from the municipal authorities our daily consumption is approximately 550,000 quarts—sufficient, by the way to fill a tank 30 feet in diameter and almost 24 feet in height. But what may interest you most is that more than 97 per cent. of this supply is pasteurized before delivery to the consumers. Moreover, a firm well and favorably known to all of you for its excellent "certified" and "inspected" milk, alone supplies daily some 7500 quarts, or more than 1 per cent. of the total, and when you add to that the raw milk of "certified" or "inspected" grade provided by others, including even those who

pasteurize most of their output, you can see that practically all of the milk supply of the city is well safeguarded for the consumer.

Director Krusen assures me that he believes the milk situation in the city at present is excellent, and I feel that he has good grounds for his belief. According to the last monthly bulletin of his department there are now 86 pasteurizing plants in operation, owned and operated by 82 firms and independent dealers. A visit to some of these will, I am sure, be a revelation to you, as it was to me, not only because of the extent of the plants and financial investment involved, but also because of the attention to detail and apparently watchful care for cleanliness and the good quality of the product. Of course, I know that all dealers are not alike in their solicitude for the welfare of their customers, but let me read what one large firm does to safeguard its supply. Quoting a note from the firm's bacteriologist:

"We will briefly outline our bacteriological work, commencing with what we call our country end.

"Every can of milk received at our Oxford, Pennsylvania, Station is tested for bacterial count: at least 200 such samples are handled daily there. After milk is brought down to proper temperature for shipping, and when in the cans, additional samples are taken and tested for bacteria. A record of these tests is sent to our main laboratory here that we may use them to check against, having made similar tests of the milk immediately upon arrival. If there is any material increase in count this prompts an immediate investigation to ascertain just what may have caused the increase, whether cans were not properly sterilized, insufficient icing during transportation, etc.

"We keep a trained man in the field to work among the farmers to educate them in the care and handling of milk and all utensils, working always to the sanitary end. Sediment tests as well as lactometer readings are also carried on at the farm.

"Our next bacteriological tests are taken immediately as the milk passes through centrifugal clarifiers, pasteurizers, coolers, bottle-filling tank and finally finished bottled milk; likewise, we at regular intervals test city water and all bottles and cans, and

this is the daily procedure. This gives a perfect check on all our pasteurizing apparatus, bottle-washing machines and can washers.

"We make daily tests for fat, solids not fat and total solids. Similar tests are being carried on to check up our ice-cream plant and our Atlantic City plant. Altogether we are testing about 3500 samples monthly."

We should not forget that we have another protection in the work carried on by the Division of Milk Inspection of the City Board of Health. Milk dealers of all kinds must be licensed, and there is a corps of milk inspectors presumably maintaining constant supervision over the entire supply. To quote from Director Krusen's last bulletin:

"The duty of the milk inspector is to inspect all milk sold from wagons, stores, restaurants and any other place where this commodity is handled. Special attention is given to sanitary conditions. As milk is so easily contaminated this phase of the work is most essential for the health of the community.

"The licensing of milk dealers has been a great benefit, as it gives the Board of Health full power to revoke the license on failure of any licensee to comply with the rules and regulations governing the sale of milk under the Act of April 27, 1909, amending June 9, 1911."

There is, however, one important need at the present time to which I shall refer later, namely, that there shall be more inspectors and that all shall be better paid than they are now.

In this connection I should mention the manufacture and selling of ice-cream, as it is so closely related to the milk industry, and more especially because it is a largely used foodstuff that may be either healthful or harmful according to the precautions employed in its manufacture and distribution.

A number of the more important firms in the city each manufacture upward of forty or fifty thousand quarts daily in the height of the season, and in their endeavors to make a product of the highest quality and maintain a well-deserved reputation for it they observe the greatest care in the selection and care of materials and in every detail of the process. The apparatus and equipment

is elaborate and expensive—I know of one plant in which, I am told, approximately one million dollars is invested—but the owners believe it necessary in the economical production of a pure, safe product in the quantities indicated. On the other hand there are many small manufacturers, some of whom undoubtedly do carry on their business in a sanitary manner and produce excellent ice-cream; but the State's pure food agent will corroborate me when I tell you that there are others who have scant appreciation of cleanliness, who have little hesitancy in using improper and illicit materials and methods, and whose products cannot be wholesome or even safe to use.

Next to milk, meat is naturally considered one of the most important commodities. With a population as great and so comparatively affluent as is ours at the present time, one reasonably surmises that the consumption of meat products of all kinds is very large indeed. The difficulty is to discover just how large it is, and experts tell me that it would take a lengthy investigation to determine it accurately, if at all. The estimate given me by those in authority at the City Hall is that it approximates nine million pounds per week. If so, I am inclined to think that a considerable part of this goes to our neighbors just beyond the city limits.

Whatever the total, part comes to us already prepared for sale and use and part is slaughtered and prepared for use here. Almost all of the first part is shipped from the great packing houses of the West, and all that comes from outside the State must bear the stamp of Federal inspection. With this safeguard and the modern methods of refrigeration, etc., in transit you may be assured that the great bulk of it arrives in excellent condition.

On the other hand that portion of the meat supply which enters the city alive or "on the hoof," as the saying is, gives us totals of large figures. Thus, in October last there were received at our stock-yards, 19,220 cattle, 32,159 hogs and 38,498 sheep, of which 18,110 cattle, 30,382 hogs and 36,984 sheep were killed, the small remainders being again shipped or remaining in the stock-yards at the end of the month.

As you probably know, we have some large and important

establishments for slaughtering and preparing meat and meat products, and a much larger number of smaller ones. As the larger ones all do an interstate business, they, of course, are under Federal supervision and inspection. And let me assure you that that inspection is a thorough one, covering every carcass and every part of that carcass. I have been in establishments where from 200 to 300 cattle or from 500 to 1500 hogs per day are killed, and have seen these men at their work. For example, on one day, of 1100 hogs killed, 78 were condemned in whole or in part, and I saw one of these held up because of two small caseous glands in the neck, one no larger than the traditional pea and the other much smaller. May I also say that I found these large establishments well managed and the work carried on in a remarkably clean and sanitary manner, especially when it came to the preparation of the so-called meat products. When I tell you of one firm that makes 60,000 pounds of scrapple and 25,000 pounds of fresh sausage daily you may think that some carelessness in handling and some dirt are inevitable in the preparation of such quantities; but you would find the conditions there almost if not quite as cleanly and satisfactory as in your own kitchens. The firm mentioned goes so far as to maintain its own steam laundry and provide its employees with clean outer garments daily, besides making provision for cleanliness in every other respect. And there are other establishments equally good and satisfactory.

In this connection I should report that I have repeatedly noticed the transportation of wagon loads of uncovered meat through the streets, which is in violation of a city ordinance and which exposes it to the very evident risk of contamination by street dirt, mud, flies, etc. Also that the employees of some of the largest packing houses and firms are as careless in this respect as any others.

As regards the smaller slaughter houses, perhaps my best commentary regarding most of them is that we should all rejoice that Director Krusen has been able to secure the court order that will compel so many of them to go out of business with the end of the current year. A number of them are in densely populated districts and in very cramped quarters, in close proximity to dwelling

houses, stores and schools. There is no doubt that a fair proportion, perhaps most of them, are operated in as cleanly and sanitary manner as circumstances will permit, but with the present number of city inspectors the multiplicity of slaughter houses prohibits the careful professional examination of every animal killed that is a marked feature of the large establishments and that is a great protection to the ultimate consumer. Another thing that we should not forget is that the operators of the small plants may very naturally be tempted and inclined to buy, at low prices, animals rejected because of poor quality or condition by the larger operators.

In addition to the large amount of dressed poultry shipped into and in storage in the city that has been already referred to, we have also a large trade in live fowls, and a number of places where they are killed in greater or lesser numbers. A visit to the wholesale centers on South Front Street, below Dock, and at 2d and Callowhill Street will be both interesting and enlightening to any of you. I can take you to one place where 1200 are killed in a day and where the conditions are reasonably good, and I can also show you another close at hand where I think you would certainly withhold your approval.

But in addition to these wholesale centers you will find many places where living chickens, ducks and even geese are kept for sale at retail, often in close proximity to other foodstuffs, although a city ordinance forbids the offering of live poultry and other provisions in the same store. In fact, I have seen food receptacles and crates of live fowl exposed side by side upon the sidewalk and with the former disgustingly soiled by the filth of the latter. I will suggest the remedy later.

As for fish, I am told that we use about 600,000 pounds of fish per day, or the equivalent of about $5\frac{1}{3}$ ounces for each individual in the city. But you must not think that this is all fresh fish, for in addition to a plentiful supply of this which we have from the nearby ocean and also from the great lakes, there is also an extensive marketing of frozen, salted and smoked fish. I saw on the floor of one large storage house, used for fish only, two car-loads

of smoked salmon from the West in great hogsheads holding 1000 pounds each, and was told that this was only part of that single consignment, as there were a number of other unloaded cars still on the siding; also that that entire lot of salmon and much more would be consumed long before the winter was over.

The principal wholesale market for fresh fish and oysters is at the foot of Dock Street, where the city inspectors maintain a fairly close inspection. At times the condemnations are large, often because of conditions beyond the control of shipper or dealer, such as delays in transit, unseasonable or changeable weather, etc.

I have already spoken of the large and steady inflow of fresh fruits and vegetables. If you wish to see much that will give you food for thought as well as for the inner man, visit the great receiving station at 30th and Chestnut Streets at half-past five or a little later any week-day morning, or Dock Street shortly after seven o'clock. I feel certain that the quantity and quality of what you see will agreeably surprise you. You may also discover various ways of combating your own high cost of living.

Butter, eggs and cheese in the general supply are mainly handled by large wholesale and commission merchants. Probably most of the cheese comes from the great cheese districts in Northern New York and Wisconsin, while the butter is shipped from many widely distributed points in the West as well as East, and the eggs from practically all over the country. You may see in the big warehouses, crates from Louisiana side by side with those from Illinois or Ohio, and also near at hand cans of frozen eggs from the big shipping houses of the West.

As regards the eggs, our present State law protects us fairly well. No egg may be sold as "fresh" which is over four weeks old, and the sale of decayed or rotten eggs for food purposes is absolutely forbidden and subject to a heavy fine. By the way, the term "selected eggs," so often used by the retail dealer, means just as much as he intends and no more. These may be eggs which he has "selected" from among others on any basis whatever, whether size, color or just pure chance.

Of late our State food agent, Mr. Simmers, has been having

experiences with manufacturers of and dealers in butter who persist in selling it with a content of more than the 16 per cent. of water legalized by the Federal standard, some being placed on the market with as high as 30 or 40 per cent. of contained water. Not to mention the lessened food value, one can readily calculate the fraud upon the customer who buys butter at eighty cents or more per pound having one-sixth or even one-fifth of added and illicit water. Unfortunately a jury in this city recently acquitted a dealer who sold such butter, presumably upon the arguments of his attorney that pure water added to the butter did not make it unwholesome.

An important part of the food supply of any city is the bread—so commonly termed "the staff of life." Probably but a very small proportion of the population is now dependent upon domestic baking, especially since the present high prices of flour and other ingredients tend to make it more economical as well as convenient to depend upon the commercial baker.

I am informed that there are about 600 bakeries in the city. Regarding the larger ones, whose names are doubtless known to you all by their extensive advertising if not by the personal use of their products, I feel that practically all are entitled to your confidence. In fact, the chance that any hand has touched in the process of making the loaf that comes into your home from one of these large and well-managed establishments is very slight indeed, for even the wrapping in waxed paper is probably automatically done by machinery. The care employed in blending four or five different brands of flour to give a bread of the desired quality, in selecting the other ingredients, in mixing and "raising" the dough and in watching the progress of the loaves through the great oven will interest and surprise you if you have an opportunity to observe it. Such plants are using hundreds of barrels of flour and turning out thousands of loaves daily with every reasonable precaution for cleanliness and the health of their customers.

On the other hand there are some, probably many, small bakeries with limited output and a local trade that are carried on in the basements of dwellings or other cramped quarters of which I think

anyone of you would quickly disapprove were you to see them and their surroundings. Probably their owners endeavor to do the best they can in observing sanitary requirements, but we must not forget that "cleanliness" is a relative term and one that is not even understood by many.

Fault may be found in the distribution of bread from some bakeries, including even some of the larger ones, to retailers and consumers, for it is at times transported through the streets in uncovered wagons exposed to the dust and dirt of transit as well as careless and uncleanly handling. Moreover, the bread boxes or containers in many retail stores are not properly protected from store dust and flies or are unsatisfactory in other respects, while the dispensing of bread by storekeepers with unclean hands can readily be noted by any observer. Hence the advantage and desirability of the loaf automatically wrapped and sealed in waxed paper at the bakery, unless you know that the sources of your supply are beyond criticism as regards the above particulars.[1]

Closely related to the baking of bread is the making of cakes, crackers, etc. Here again we have some excellent firms of large output and good repute whose products you may purchase without hesitancy, and also others that, from past experience, warrant and get the close observation of the State's pure food agent. Some of you may remember the exposé many years ago of the extensive use of "chrome yellow," a dangerous salt of lead, in such bakeries. Of late the more frequent offences have been the use of rotten eggs and other unwholesome ingredients, with too often failure to observe decent and reasonable precautions as to cleanliness in manufacture and handling of the product. It may interest you to know that in one bakery, where I understood the output of cake to be five tons per day, I found that they were using dried eggs from China in conjunction with domestic eggs. This imported product, however, has been found unobjectionable and has received the sanction of our food authorities.

No review of the food situation would be complete without some

[1] This paragraph was inadvertently omitted from the copy of the paper read at the meeting and thus gave occasion for Dr. LaWall's very pertinent remarks.

reference to the subject of beverages, particularly those commonly known as "soft drinks." Even before the advent of Prohibition and the elimination of the sales of alcoholic liquors the consumption of these non-intoxicating beverages was enormous. What it will be during the coming and subsequent "dry" seasons is hard to predict. I found one large bottling establishment, where, by the way, every reasonable precaution as to the filtration of water, purity of ingredients, cleansing and sterilizing of bottles seemed to be observed, that had a daily output of 3000 cases, or 72,000 bottles, and which, because of the inability to satisfy the demand by manufacturing to the limit of the plant's capacity in the height of the season, will soon begin to make and store a part, at least, of next summer's supply. In such an establishment, and others like it, we shall find little to criticize. But, on the other hand, because of the cheapness of the constituents and simplicity and ease of making these "soft drinks," there are a number of manufacturers in the business whose products, to say the least, are unsanitary if only from the standpoint of cleanliness alone.

I have seen a bottle purchased in open market and offered as evidence before one of our magistrates that contained, among other solid material, a fairly large cockroach, and I have seen in some of these smaller plants other bottles ready to go out for distribution and sales that contained much visible insoluble dirt. Protests were made by the owners that they were doing the best they could to observe the regulations, but I am forced to believe that one serious trouble is that many of the makers of such beverages, like many of the small bakers (and also a multitude of small grocers and provision merchants), scarcely comprehend what the terms "cleanliness" and "sanitation" mean.

However, Mr. Simmers will tell you that a number of these soft-drink makers are also chronic offenders in their frequent attempts to use unwholesome and proscribed artificial flavors and colors.

Thus far I have spoken to you, perhaps at too much length, of what may be termed the wholesale or general food supply, and may reiterate that, with the exception of the products of some small bakers, bottlers, etc., I believe that its quality is excellent.

But when we come to the purveying and distribution of this great supply of food to the ultimate consumers, we find that there is ground for considerable criticism and much improvement. I do not know, of course, how many or who of you are personally cognizant of how and from where the food for your own tables is purchased and provided. Doubtless for most of you it comes from clean, well-kept stores and markets to which none of us, at least at first sight, would take exception. But how about the bulk of the population, especially those who may not be as fortunate in location or social circumstances as ourselves?

For the retailing of food to the family or individual consumer we have the public market houses, most of them old and well established, the local groceries and provision stores, delicatessen shops, huckster wagons and push-carts, and for transient or cooked meals, restaurants, dairy lunches, cafeterias, etc.

Philadelphia's public market houses are old-time institutions, and I am well aware have a place in the customs and habits of the community. Moreover, improvements and progress are evident in some to the extent of new, up-to-date and sanitary "stalls" for some of the dealers, and of the cold-storage and other facilities provided their renters generally. But I think I shall be upheld when I say that, as far as my knowledge of them goes, all are behind the times and none commensurate with what Philadelphia should have. If you doubt me, compare any one of them with the new Washington Market at the foot of Fulton Street in New York City, and I think you will quickly agree that Director Krusen is on the right track when he urges new and modern municipal market houses for the city.

There are in Philadelphia probably more than 6000 grocery and provision stores. Many of these are clean, orderly and well managed. The State food agent informs me that the so-called chain stores give him practically no trouble, because every purchase contract for foodstuffs made by the management clearly specifies that all articles purchased must meet the legal requirements in every way. But there are many dingy, dirty and disreputable stores in the city, most of them small in size and evident volume of

business, whose owners apparently belong to that class which does not know what cleanliness means. Happily, much of what they sell is in the form of canned goods or original packages which are only opened by the consumer, but there is still a large proportion of articles that are measured and sold in bulk, and that are consequently exposed to contamination by the dirt of the store, flies and careless and unclean shopkeepers.

In addition to unclean and unsanitary goods, I think I can also say that examination would show the presence of much that is overaged and stale upon the shelves of these stores, and I am convinced that a statute law requiring that every can of edible material be plainly stamped with the year of packing in the tin and that every other sealed package have the date plainly printed on the container, would be greatly to the benefit of the consumers. If one buys such goods he rightly wishes to know whether they are unduly stale and to what extent. Such a regulation would benefit the whole community, as I have recently seen in a very large and well-known store a considerable quantity of canned goods whose outside cases were stamped with June, 1918, as the date of packing.

You will doubtless be surprised to learn that unless the keeper of a grocery or provision store deals in meat, poultry or fish he is not required to have a city license and is only amenable to the inspection of the State food agent insofar as he transgresses the pure food statute.

When it comes to suggesting a remedy for the deplorable conditions which I find so prevalent, I must confess that I am at a loss, for I believe any real progress and improvements must be based upon the general education of not only the storekeepers but also their clientèle as to what constitutes cleanliness and true sanitation.

I have made no extended survey of delicatessen stores, as I felt that the nature of the business and character of goods dispensed required a quick turn-over, and also that in the main the general mass of customers who patronize them would demand a reasonable degree of cleanliness and sanitary observance in their conduct.

Butcher shops, meat, fish and oyster stores are required to have a city license, and are nominally under the supervision of the city

meat inspectors. But this force of only seven men has also the surveillance of the large number of slaughter-houses and poultry killing establishments, the wholesale meat district, fish wharves and the market trains that bring meat from the nearby farming districts, so that a large part of the store inspection has been transferred to the corps of milk inspectors whose number, sixteen, is also too limited for the best service to the city.

So far as I know no one has ever given even an approximate estimate of the total amount of foodstuffs sold here from huckster wagons and push carts. It must be very great, and, from the nature of the trade, it must often be of poor quality. Probably in no other purchasing is it so necessary that a buyer heed the old maxim—*caveat emptor*—for unless the seller have a well-established route or stand and be fairly well known to his customers the latter may find themselves defrauded both as to the price and the character of the food purchased.

A unique feature of the city's merchandizing are the push-cart markets in certain sections, as along Fourth Street below South, Seventh Street near Snyder and Ninth Street below Fitzwater or Catherine. For several blocks one will find a large number of push-carts arranged end to end as closely as possible along the curb and each with one or more kinds of food offered for inspection and purchase to the passerby. Having no rent or high overhead charges to pay, it is possible that the owners may offer their wares at lower rates than do the stores of the neighborhood, but of this I am doubtful. Although they apparently do supply a need to their portion of the community, a very casual inspection will show that the food sold is exposed to the dust of the street, flies, promiscuous handing by unclean customers, etc.; also that the conditions of the food offered may at times be far from wholesome or good. However, I invariably found the streets along which they were grouped in a very dirty condition, although I was told that, as a rule, these streets were cleaned daily (or nightly) before the beginning of business in the morning. This I doubt.

Undoubtedly if these push-cart merchants are to be permitted to continue their trading in these particular locations the munici-

pality should replace the present rough block pavements, which it is impossible to clean properly, with smoother ones of asphalt, and then to require that these be kept in a reasonably clean condition at all times.

I am not sure that your committee intended that I should also make a similar survey of the restaurants and other eating-places in the city; but if so, I must confess that thus far my observation has been but a casual one, and that all I can report is that there are many places which for lack of attractiveness and apparent uncleanliness are on a par with the worst of the grocery and provision stores that I have described.

Having thus outlined the present status of and condition pertaining to the food supply of Philadelphia, you will ask me what recommendations or suggestions for betterment I have to make. Briefly they are as follows:

1. Support, as strongly as possible, the present Director of Public Health and Charities in his request for power to appoint additional meat and milk inspectors and for increased pay for those now serving and those to be appointed. Also urge the importance of this upon his successor, who has recently been appointed. As I have told you the Federal inspection of meat and meat products is a good inspection. I regret that that cannot be said of our municipal inspection, not because the present inspectors wilfully neglect or slight their duties, but because it is a physical impossibility for them to adequately and satisfactorily cover the work. If the Federal force here, which numbers 82 individuals, is necessary to properly supervise the establishments doing interstate business, surely many more than the 7 meat inspectors (or the 23 meat and milk inspectors combined) are necessary to look after the incoming shipments and the killing in the small and widely separate slaughter- and poultry-houses—not to speak of the 200 or more places where sausage, scrapple and other meat products are made—the butcher shops, fish markets, etc. As one of these inspectors, who tells me that his day is often ten hours long and his duty requires the constant surveillance of two rather large and adjoining slaughter-houses whenever killing is being done, and the

supervision of half a dozen smaller ones whenever he can find time for it, said to me but a few days ago: "Urge the appointment of more inspectors as strongly as you can. Of course, I would like to have the increase of salary the Director is asking for, but it is even more important that we should have more men to help us, for we cannot possibly do all that should be done."

As for the increase in salaries, we should realize that in these times we cannot expect to employ and retain men of the intelligence, training and integrity that such officials of the city should be for the paltry salary of $100 per month; and also that this present force is costing the municipality practically nothing, for the return of license fees and fines for the year almost if not quite equals their combined salary charge.

2. Support with equal energy the Director's efforts for the construction of modern municipal market houses and municipal abattoirs. The former of these should be centrally and conveniently located in the main divisions of the city, such as North, South and West Philadelphia, and the latter also in convenient places, but beyond the limits of present or probable residence districts. And while the expense of buildings of proper design and construction for these purposes will probably be large, their respective privileges should return such rentals as either to make them paying investments for the city or else to give us the greatly increased safeguarding of the public health which they would assure at very low cost indeed. As the Dean of the College of Veterinary Medicine of Ohio State University said in an address to the Municipal Health Officials of Ohio in January, 1919: "The success of the Federal system (of inspection) depends largely upon two factors: (1) The special training of the men employed; (2) the centralization of the operations of slaughter." So a properly constructed and managed series of municipal abattoirs would go a long way toward remedying our present difficulties and shortcomings, while the city's new and up-to-date market houses should not only benefit our citizens practically by ensuring a better and more wholesome retail food supply, but should also be a great means of popular education in sanitary matters of this nature. It goes

without saying that once the city abattoirs are constructed, all slaughtering of animals elsewhere should be prohibited, except in the large establishments under Federal inspection.

3. I believe that we should inaugurate a movement looking to the prohibition of the exposure of food and foodstuffs for retail selling on the public streets or outside of buildings generally. There will, of course, be tremendous opposition to this, but the more one sees of the present conditions the more, I think, will he agree with me that such a measure is highly advisable. An ordinance of June 19, 1916, reads as follows:

"Section 1. The select and Common Councils of the City of Philadelphia do ordain that after the passage of this ordinance it shall not be lawful for any person, firm or corporation to keep, expose, display, transport, sell or offer for sale, on any sidewalk or in any street, alley or highway of this city, any farinaceous or bakery product, confectionery, shelled nuts, dried fruits, pickled products, meat or fish products, butter, cheese or any foodstuffs prepared for eating or any beverages, unless the aforesaid foodstuffs and beverages shall be protected from dust, dirt, flies, promiscuous handling or other contamination, and when displayed shall be covered with a closed container of glass, wood, metal or other suitable material.

"Section 2. All foodstuffs and beverages, and all fruit and vegetables, when placed outside of buildings, must have the bottom of their containers raised not less than eighteen inches above the sidewalk, pavement or ground level; and it shall not be lawful to wrap any article of food enumerated in Section 1 of this ordinance, in newspaper; nor shall any paper, except clean wrapping paper, be used for wrapping said articles of food.

"Section 3. Any person violating any of the provisions of this ordinance shall be liable to a penalty of $10 for each offence committed, to be recovered as penalties of like amount are now by law recoverable."

You will, however, not have to travel far along any one of a number of streets before you find the ordinance violated in almost every particular, and it is difficult to see how we can hope for much

betterment as long as the foodstuffs are thus exposed out-of-doors unless we have a far more drastic policing of these places than our people have been accustomed to or than any but a greatly enlarged inspecting force could supply.

4. Begin to organize a campaign of education regarding the importance of the sanitary care and handling of food not only for the instruction and benefit of the careless and unclean shopkeepers or handlers of food, but also for the public at large. When the latter are fully impressed with the importance of the subject in general they will, in all probability, make the former appreciate the direct economic advantage of it to themselves.

5. While I am naturally opposed to anything savoring of monopoly, and have nothing but condemnation for those things done by and in the name of "Big Business" that are inimical to the public welfare or subversive of freedom of opportunity for all, the more I see of this great food question the more I am convinced that the public health and welfare are conserved by the use of the foods and products from the large, well-managed and properly supervised establishments, and that they are endangered by the corresponding foodstuffs from small and unclean shops, bakeries, bottlers, etc. How we should proceed to reform the latter or regulate them out of business I am not prepared to say, but I am persuaded that, in general, greater safety and satisfaction will result from patronizing the larger manufacturers and dealers, and that, harsh as it may seem to say it, for the benefit of the greater number of individuals, many of the smaller dealers should be compelled to seek other means of livelihood.

6. You should appreciate and support the excellent work of the Federal inspectors of this district, and especially of the State food agent, who also needs more assistants. In spite of the fact that the great majority of food dealers seem to endeavor to observe the requirements of our statute laws and municipal ordinances and err through ignorance, if at all, there are probably about 300 chronic offenders in the city who have shown that they will not hesitate to violate the law if they think they can avoid detection and punishment. To thwart and checkmate these or to bring them to

justice is one of Mr. Simmers' chief duties and requires a full stock of vigilance and shrewdness. Unfortunately, violations of city ordinances do not, as a rule, carry sufficiently heavy penalties to deter dishonest offenders, who only load the imposed fines upon their subsequent customers, and too often a jury trial results in a verdict for the defendant, who is pictured as the victim of persecution on the part of hostile city officials.

Hence, the main dependence for the prevention and correction of these misdemeanors must be placed upon the application and enforcement of the more drastic penalties of the State law.

7. A study of the present statutes and ordinances pertaining to the purveying and dealing in food, and a comparison of these with those of other States and cities, will probably show opportunities for suggested improvements and possibly lead you to use your influence for their alteration or amendment.

In conclusion, I wish to express my very great appreciation for the helpful and kindly assistance that has been given me by Director Krusen and all his staff, especially including Mr. Vogelson, Chief of the Bureau of Health, Mr. Clegg, Chief Milk Inspector, Dr. Behrens, Chief Meat Inspector, and their assistants; to Mr. Robert Simmers, the State Food Agent and his assistant, Mrs. Miller; and to Dr. C. A. Schauffler and Dr. Thomas Castor, of the Federal Bureau of Animal Industry. If you find any merit in my survey, credit must be given to them. I have also to thank the heads and superintendents of the many great establishments visited, who have given me every opportunity to see conditions as they are in the respective plants.

If my report has not proved uninteresting or tedious, may I again express to you, as Fellows of the College of Physicians, my appreciation of the honor of the invitation to address you and thank you for the courtesy of your considerate attention.

DISCUSSION

Dr. Wilmer Krusen: This contribution to the College of Physicians should be presented, I think, to every woman's club and to every civic organization of Philadelphia, that they may appreciate what has been done and what is necessary to be done to improve these conditions. The need of more inspectors in Philadelphia is, I am sure, obvious from Dr. Egbert's presentation. We had during the past summer several anxious weeks fearing that the ice supply for Philadelphia would be inadequate. Only a few days ago Mr. Vogelson and I were present at the State meeting of the Pennsylvania Ice Manufacturers' Association and urged the building of greater ice plants. There is a direct relation of ice to food supply. Dr. Egbert has reviewed the milk supply, and here again ice is an important matter. There has been an improvement in the milk supply of Philadelphia: There seems to be a greater coöperation of the milk dealers with the Board of Health. Public education and public sentiment are necessary in the problem of the city's food supply. We have laws and ordinances enough. The enforcement of these depends upon the men we can get to enforce them. The fight to eliminate the slaughter-house was a bitter one. We have to educate not only the owners, but magistrates and judges, to an appreciation of what we are trying to do for the conservation of health. I am glad that Dr. Egbert emphasized the need for municipal abattoirs. The establishment of these will eliminate one of the great evils in Philadelphia. We ought to eliminate also the so-called curb market; but here we have been between two influences. We have been urged to coöperate in the effort to reduce the high cost of living by favoring these markets. I agree, however, with Dr. Egbert that the absolute elimination of all curb-market selling and the erection of municipal markets in different parts of the city will be the better plan. The pictures which Dr. Egbert has shown are taken in the part occupied by the foreign population, and the fact that we have 400,000 foreign-born people in Philadelphia is significant; their ideas of cleanliness do not correspond with those of the average housewife. The coöperation of the public with the health officers is a necessary matter. As a Fellow of the College, I may say that I am glad that the conservative College of Physicians of Philadelphia is taking an interest in matters which are so practical from the public health standpoint.

Dr. A. C. Abbott: I concur in every one of Dr. Egbert's recommendations and take the floor only to emphasize one or two of them. Emphasis should be laid particularly upon the necessity for addi-

tional inspectors. I do not feel that Dr. Egbert's paper or the pictures shown by him give an idea of the magnitude of the task having to do with the food supply. It is impossible for the present force of inspectors to do the work even reasonably well. The slaughtering of cattle for food will never be satisfactorily done until it is centralized in buildings owned and controlled by the municipality. Under existing conditions there have been times when we denounced sheep and chickens being killed in the second-story bed rooms of occupied dwellings. The other phase of Dr. Egbert's paper I was quite prepared to hear, namely, that there is very little fault to be found with the raw foodstuff coming to Philadelphia. We are very fortunately located in the heart of one of the richest agricultural parts of the United States, with splendid railroad facilities, so that the meat and vegetable supplies come into the market in good condition. However, after that food supply leaves the hands of the wholesaler and starts to go down the steps (if I may use such expression) until it gets into the hands of the ultimate consumer, goodness only knows what may happen to it! and when it gets into the open pushcart on the filthy sidewalks you may be astonished that anyone wants it; but try to rid those neighborhoods of the pushcart vending and you will have the majority of the people against you. The pushcart is a great convenience and the people, largely of foreign birth, will protest vigorously if you make the slightest effort to eliminate it. We can correct the condition best by the education of the children, and looking to the coming generation for greater wisdom on these matters. It is scarcely worth while to attempt to educate the adult foreigners. Dr. Krusen has made a most important suggestion in saying that Dr. Egbert's paper ought to be presented to all the women's organizations of Philadelphia. Dr. Egbert compared our markets with the modern markets of certain other large cities. Those cities have a group of first-class, well-appointed stores under one roof, with cold storage, heat and light and facilities for keeping the buildings clean. We have no such thing in Philadelphia. One would suppose that such intelligent gentlemen as comprise the Second Street Business Men's Association would insist on improvements in the Second Street Market, taking it as an illustration.

Mr. Vogleson: Anything which I can say is but emphasis on the paper of Dr. Egbert and the discussion by Dr. Krusen and Dr. Abbott.

The slaughter-house shown on the screen is happily one of the things that will be of the past at the beginning of 1920. The pictures of slaughter-houses were prepared from the exhibit used by the Bureau of Health in the presentation of its case in court, which resulted in a decision ordering the slaughter-house shown to be closed on December 31, 1919.

The use of sidewalks for the display of any kind of merchandise is a nuisance, and as a slogan for bettering such conditions I would suggest, "Sidewalks for Pedestrians Only." Let us rid our sidewalks of the clutter which encumbers them in many places at the present time and see that we have a clear space between the house line and the curb. The removal of all encumbrances from our sidewalks will be a distinct sanitary betterment.

It was a pleasure to hear the statements made by Dr. Egbert concerning the milk supply of Philadelphia. After the License Law of 1909 had been passed, regulations were made by the Board of Health under the authority of that Act, and a constant battle during five or six years was required to better the milk supply, and the improvements were only secured when the citizens of Philadelphia demanded them. One of the first efforts to clean up the milk supply was the prohibition of "dip" milk, which was followed by a court decision. The next step by the Board of Health was a temperature regulation, which became the subject of a number of hearings before the Public Service Commission. Fortunately the general manager of one of the largest transportation companies entering the city stated that his company would establish a milk refrigerator car service. Following this the remaining contestants quickly made arrangements for similar service.

Later, the requirements governing pasteurization were adopted within a few days of the time at which the regulations were to become operative, and late on a Friday afternoon the Health Department was served with papers requiring them to appear in answer to a bill of equity on the following Tuesday. Fortunately, men from New York, Harrisburg and Washington came to our aid and the injunction was denied. Back of all these incidents, however, was the community demanding a better milk supply. Likewise, when the people of Philadelphia will give their full support to a movement for a clean food supply for this city, not only from the point of origin as described by Dr. Egbert but throughout its distribution in the city, they will obtain it.

Dr. Thomas Castor: Inasmuch as Dr. Egbert has given the Federal Bureau such a clean bill of health, I think we do not need to say anything further in our favor, but I would like to add a word of emphasis to Dr. Egbert's suggestion concerning the necessity for one or more municipal slaughter-houses. That, I believe, is the one big factor necessary in securing a better and cleaner meat supply for Philadelphia.

It is impossible, as has been already brought out, for the few city inspectors to cover adequately the large number of butcher shops and slaughter-houses they have under their supervision. In the Federal service we

have over sixty men in Philadelphia; thus in one establishment we have four men on duty continuously; in another, two men all day and one all night. In the West Philadelphia district, about the stock-yards and the slaughter-houses located there, we have fifteen inspectors on duty. We also have two or three inspectors patrolling the city at night. Thus it can be seen how entirely inadequate is the force of seven city inspectors provided to cover the entire city of Philadelphia.

Mr. Robert P. Simmers: Dr. Egbert spoke in reference to the water in butter. When you pay 82 and 85 cents per pound for butter you are paying for 32 per cent. of water, which costs nothing. We have found this to be true in the markets and traced the matter back to the creameries, and some of the offenders have been arrested three and five times. Dr. La Wall can give you more information on this subject than I. Eggs bought in China for three cents a dozen are being used in the large cities of this country; the cost of delivering here is 8 cents a pound. These eggs are opened in China, frozen and shipped here, being kept frozen when delivered to the bakeries. They are examined and found to be all right for food purposes. They must, of course, be used at once when taken out of cold storage. There is no law, so far as we are concerned, as to the sanitary conditions under which food products must be delivered, a bill before the last legislature having been defeated. Such a law should be placed upon the statute books. In the city of Philadelphia we have found conditions in this respect horrible. In one room, 15 x 20, there was found a bottling machine and washing tub, the water in which was so dirty you could not tell there were bottles in it. The room was also used as a stable. I am, of course, talking from the bad end of the matter. Dr. Egbert has spoken of the better aspect. We also had passed a law respecting the selection of eggs. In trying to educate the foreign-born regarding sanitary conditions we had placards printed by the department with information in English, Italian and Hebrew. The department appreciates very much the coöperation of the people in helping to eradicate many of the evils that are present. The conditions are, I think, at least 50 per cent. better than eight or ten years ago. We are always ready and anxious to receive any complaint and I can assure you that such will always be investigated at once. We will get the samples of the product, as we always buy our own goods to prove our cases.

Dr. Charles H. La Wall: I first became associated with the food inspection in 1904, since which time I have been rather actively engaged with it in the city and county. In certain ways we have had a gradual development for the better in the care of food. We are up against a

condition now in which the public must be educated. There is too much exposure of foods which are not washed before being eaten. I wish Dr. Egbert had spoken of the relative merits of wrapped and unwrapped bread. I have recei ed many complaints upon this subject. I personally saw a driver of a bakery wagon sitting upon a large crate of rolls while making deliveries, because the wagon was overloaded and he had the crate for a seat. There are a number of improvements that can be made in the sanitary handling and regulation of foods. On the whole, however, I believe we have made great progress, and I am confident that Dr. Egbert's service will be of great value in furthering this improvement.

Dr. Egbert (closing): Dr. La Wall has made a good point in reference to the delivery of bread. The larger bakeries are, I think, as a rule, handling the bread in the right way. Of course, after leaving the bakery there still can be faults in delivery. There is no question that much of the bread from some of the big places is handled in an improper manner; in my paper, as read, I was referring more especially to the way in which it was made. I inadvertently omitted reference to its mode of delivery. In some of the places no hand touches more than one loaf in a hundred even from the time the flour leaves Minneapolis until it is baked and ready for sale. An occasional loaf is weighed to see that the weight is maintained, but the men who take the bread from the ovens wear cotton gloves.

DECEMBER 17, 1919

Occupation in Relation to Tuberculosis

BY GEORGE M. KOBER, M.D.

It is a great pleasure and honor to appear before the Section of Industrial Medicine and Public Health and to address you in response to the invitation from Dr. Anders on "Occupation in Relation to Tuberculosis."

Health is the chief asset of the workingman, and no greater calamity can befall him than when his earning capacity is impaired or arrested by reason of sickness or disability. It means in many instances the utter financial ruin of the family, and is doubtless one of the most potent causes of poverty and distress.

In the search for the causes and prevention of disease the interest

of the wage-earners have not been neglected; indeed, it may be truly said that a special department has been created, known as "Industrial Medicine and Hygiene," with a very creditable but by no means a complete literature of its own.

The necessity for devoting special attention to this subject was shown long ago by observations made by Hippocrates and Galen, that certain occupations and trades, even in those primitive periods, were dangerous to health. These and subsequent authors refer in their writings to occupational diseases of miners, bearers of burdens, messengers, sailors, soldiers, chemists and professional men. The first systematic treatise on diseases of occupation was written by Professor Bernardo Ramazzini, of Padua. His monograph *De Morbis Artificium Diatriba*, published in 1700, was translated into English in 1705 and also into French in 1711, and awakened a deep interest in these countries and also in Germany.

Diseases of occupations are everywhere assuming more and more importance, not only to wage-earners and employers, but also to physicians who, in order to make an early diagnosis and give the patient the full benefit of treatment, should know the conditions and health injurious factors under which our fellow-men and women live and work. In countries and states where reports of certain occupational diseases are compulsory it is quite possible to secure fairly reliable data as to the number of cases of specific industrial poisoning.

The same may be said of the facilities afforded by the statistics of the German industrial insurance institutes, which furnish not only the number of deaths, but also the number of cases treated, together with the age period and duration of the disease. Similar facts, together with the results of highly specialized investigations, are now being collected and published in gratifyingly increasing numbers by Federal and State Governments.[1] Such special investigations are all the more important when it is remembered that even the most complete statistics fail to reveal all the factors

[1] It is interesting to note that the first investigation by the Federal Government was made in Philadelphia in 1902, at the request of Hon. Carroll D. Wright, by my former student, Dr. C. F. W. Doehring. The result of his investigation in the manufacture of white lead, linoleum, fertilizers, etc., were published in 1903 in Bulletin 44 under the title of Factory Sanitation and Labor Protection.

which influence the health and longevity of operatives. Great differences are found in the conditions under which the work is performed, some of which are entirely avoidable while others are not, and it is hardly fair to characterize certain trades as dangerous when experience has shown that no harm results when proper safeguards have been taken. In the consideration of this question, the personal element of the workmen, their habits, mode of life, etc., cannot be ignored. Many persons are engaged in occupations for which they are not physically fitted, while others ruin their health by vice, dissipation, improper food and insanitary home environments. There are also a number of occupations in which the alcohol habit prevails to an unusual extent, perhaps because of the character of the work, perhaps as the result of association; and it would not be fair to attribute the ill-health of the operatives altogether to the character of the employment. In addition to all this there are factors, such as malaria, water and soil pollution, especially hookworm infection, for which neither the industry, employer nor employee are primarily to blame.

All this emphasizes the need of a thorough study of existing conditions, in order not only to determine the relative health risks, but also to formulate rules which may remove the causes, or render the system better fitted to resist them. It is largely a public health problem, and in this, as in all preventive efforts, a hearty coöperation is absolutely essential. In this instance the responsibility rests with the State, the employer and employee and the physician; each has certain duties to perform and the help of all is necessary for the removal or mitigation of existing ills.

As a result of numerous independent investigations, it is known today that persons habitually engaged in hard work, especially in factories and indoors, present a greater amount of sickness and a higher mortality than persons more favorably situated, and that the character of the occupation influences to a great extent not only the average expectation of life, but also the prevalence of certain diseases.

Etiology of Tuberculosis. From our knowledge of the etiology of tuberculosis we know that while the tubercle bacilli are not ubiquitous, they are at least widely scattered, the modes of

invasion are also numerous, and yet there is a large proportion of those exposed to infection who do not develop the disease. This shows that in addition to the germ there must also be a suitable soil for the development of pathogenic effects. Such a soil is usually found in persons of feeble physique, victims of malnutrition whose bodies have been weakened from any one or more of the numerous causes, which are afloat, whether it be a previous attack of sickness, hurry, worry, chronic fatigue, loss of sleep, vice and dissipation, insufficient and improper food, insanitary homes, lack of pure air, etc.

Clinical experience indicates that faulty nutrition,[1] debility, loss of blood, anemia, mental anxiety, diabetes, whooping-cough, measles, alcoholism and many other diseases favor the development of tuberculosis.

We also know that a predisposition may be inherited, as evidenced by a delicate physique, narrow chest and general vulnerability of the tissues.

A vulnerability of the tissues may also be acquired by indoor life and dusty occupations, especially when the work involves exposure to dampness, extremes of heat and cold, sudden changes in temperature and last but not least exposure to industrial poisons.

Danger of Indoor Life and Occupations. I am not disposed to overate the dangers of indoor life and occupations. Indeed, there may be no danger at all, so far as the air is concerned, if steps have been taken for the removal of impure and the introduction of pure air. If, however, these precautions are neglected there is every reason to assume that the habitual inhalation of air, vitiated by dust, the products of respiration, combustion and decomposition, and by the possible presence of toxic fumes and gases, plays an important role in the causation of respiratory diseases. All of the injurious effects are intensified when human beings are obliged to occupy rooms with an air supply insufficient for the proper oxygenation of the blood, and also when, because of inadequate floor space, contact infections are more frequent. As a result of these adverse

[1] The influence of an inadequate food supply is shown by the fact that the mortality rate from tuberculosis in Germany is as high now as it was in the early eighties, all the gains having been wiped out because of lack of sufficient food and the consequent diminished resisting power of the system.

conditions we note an undue prevalence of consumption, pneumonia, septic sore-throat in crowded workshops, dwellings, prisons and formerly also in military barracks and battleships. The influence of overcrowding on disease of the air passages, amounting at times to epidemics, was well illustrated on the Isthmus of Panama, and, as suggested by General Gorgas, accounts probably for the undue prevalence of these diseases among the gold miners of the Transvaal. By moving the laborers on the Isthmus from large, crowded barracks into single huts and rooms, with not less than fifty feet of floor space, the pneumonia rate was reduced in one year from 18.4 to 2 per 1000.

Another bad effect in many indoor occupations is that the work is often performed in a stooped position. The effects are especially harmful in youthful workers, whose osseous system is not fully developed. Among the more important effects should be mentioned the hollow chest and round, stooped shoulders as seen in tailors, engravers, lithographers, jewellers, watchmakers, metal grinders, shoemakers, and all others obliged to assume a more or less bent-over position. All thoracic postural deformities naturally interfere with free expansion of the lungs and hence with the respiratory functions, and also cause constipation, congestion of the portal circulation and hemorrhoids. Many of the deformities, it is true, have been acquired in the school, but should be remedied in the workshop by adjustable seats, prompt correction of faulty positions and well-regulated gymnastic exercises, especially of opposing groups of muscles.

The latest United States occupational mortality statistics for 1909 show that the mortality from tuberculosis in agricultural pursuits was 8.7 per cent.; among book-keepers and accountants, 22.5 per cent.; and in servants and waiters, 27.4 per cent. If we stop right here the evidence would be overwhelming in favor of outdoor employment. But when we find that the mortality in Government officials and bankers is less than 8.7 per cent., and that for draymen, hackmen and teamsters it is 23.4 per cent., it becomes apparent that in estimating the hazards of indoor occupations, other factors, such as physique, habits, exposure to dust, social conditions and standard of living must be considered.

Dusty Occupations. Hoffman[1] estimates that of the 44,130,000 American wage-earners of both sexes approximately 4,000,000 work under conditions more or less detrimental to health, on account of the presence of an excess of atmospheric impurities, predisposing to or accelerating the relative frequency of tuberculous and non-tuberculous respiratory diseases, and submits the following table:[2]

Trade group.	Males. Number.	Males. Per cent.	Females. Number.	Females. Per cent.
Metallic dust	258,454	7.6	33,255	4.9
Mineral dust	514,691	15.8	15,332	2.3
Mineral industries	844,897	25.9	550	0.1
Vegetable fiber dust	336,323	10.3	296,135	44.0
Animal and mixed fiber dust	183,937	5.6	149,262	22.2
Organic dust	531,911	16.3	177,545	26.4
Mixed organic and inorganic (public) dusts	594,285	18.2	1,399	0.2
Total	3,264,500	100.0	673,478	100.0

The dust which we inhale is fortunately largely arrested in the upper air passages, especially the nostrils, and in case of mouth breathers also in the buccal cavity. In an ordinary way the dust arrested in the nose, unless ejected by sneezing, mixes with the mucus, and after reaching the throat, also with the saliva, and is unconsciously swallowed. Only a small amount of the dust actually reaches the lungs. Saito,[3] working in Lehmann's Laboratory, located from 4 to 24 per cent. of the total amount of white lead dust in the respiratory organs and the remainder in the digestive tract.

Nature has provided numerous safeguards to prevent lodgment of dust in the lungs, such as sneezing, coughing and in the ciliated epithelial cells of the trachea; but when, as a result of long-continued exposure, this protective influence is diminished or ceases, dust will reach the air vesicles and produce mischief.

In Laborde's experiments with guinea-pigs exposed to the inhalation of fine white lead dust the animals died within two hours.

[1] Mortality from Respiratory Diseases in Dusty Trades, U. S. Department of Labor, Bureau of Labor Statistics, No. 231, June, 1918. On pages 46 to 50 the lists of occupations representing the various dusty trades groups are given and offer serious food for reflection.

[2] Compiled from Report of Bureau of the Census on Occupational Statistics, 1910.

[3] Saito, Yoichiro: Experimentelle Untersuchungen über die quantitative absorption von Staub, München. Arch. f. Hygiene, Bd. lxxv.

In the lungs were found intense congestion and ecchymoses. When the exposure was less intense and the animals lived longer, similar but less profound vascular changes were found in the lungs, pointing to direct irritation from the dust. Under ordinary circumstances, and with limited quantities of soluble dust, the epithelial motile cells endeavor to protect the lungs once more by taking up the fine dust particles and transporting them through the lymphatics into the bronchial glands. When, however, the amount and character of dust is beyond their capacity it acts as a foreign body, causing an irritation, which is followed by a catarrh and the more serious chronic reactive inflammations of the respiratory organs so common among persons engaged in dusty occupations. The chronic inflammatory conditions thus produced are generally known as "pulmonary fibrosis." The degree of injury to the respiratory organs depends upon the character of the individual particles of dust and their chemical composition. It is generally admitted that the sharp, angular and non-absorbable particles of metallic and also of mineral dust, especially dust containing silica, are much more liable to produce an intensive irritation and even actual abrasions than organic dust, and hence it is reasonable to assume that they may thus favor invasion of bacilli or lighting up latent lesions.

It is also doubtless true, as pointed out by Collis,[1] that dusts are more injurious if they differ in their chemical composition from the elements of which the body is normally composed. This may account for the fact that lime dust, in spite of its angular form, and plaster-of-Paris, with its more or less acute angles, as also cement dust, are comparatively innocuous.

Nieszytka[2] reports that while 76.5 per cent. of all the deaths among the sandstone workers in Hanover are caused by tuberculosis. According to Grab's statistics, tuberculosis in limestone workers is the cause of death in only 7.5 per cent. of the total mortality.

Koelsch[3] confirms Grab's statistics with reference to the lime

[1] International Medical Congress, London, 1913.
[2] Vierteljhschrft f. Gerichtli. Med., 1912, vol. xliii, Suppl. Heft 1, 2, p. 143.
[3] Krankheit u. Soziale Lage, 1st Liefg., München, 1912.

and cement industry, and adduces evidence to show that among 400 workers in a German plaster-of-Paris establishment no cases of tuberculosis occurred during a period of seventeen years, and that of 40,824 deaths from tuberculosis analyzed by Fisac in Spain only 17, or 0.41 per cent., occurred in lime or gypsum workers. Selkirk,[1] of our own country, was also unable to find a single case of phthisis among lime workers, nor could he learn of any worker in lime kilns having died from this disease.

It is generally admitted that only the finest particles of dust, regardless of its source, gain access to the lungs, and that the volume of dust, intensity and duration of exposure play an important role in the degree of injury inflicted.

Municipal Dust. I have analyzed the original tabulation by the Prudential Insurance Company of America based upon its Industrial experience from 1907 to 1912, and find that 10,567 deaths occurred in individuals exposed to municipal dust. This group includes street cleaners, drivers, draymen, teamsters, coachmen, street-car conductors and street-car motormen. The proportionate mortality from consumption is 23.8 per cent. and from other respiratory diseases 11.8 per cent. from all causes at ages of fifteen or over. But when we find that the mortality from consumption in the street cleaners is only 12.9 per cent. compared with 25 per cent. in street-car conductors and street-car motormen and 33 per cent. in coachmen, we are forced to the conclusion that other factors besides the element of dust have to be considered.

General Organic Dust. In the same study we find that 5694 deaths occurred in workers exposed to general organic dust. This group includes bakers, candy-makers, flour-millers, glove-makers, harness-makers, belt- and pocket-book makers, shoe-factory workers, tannery finishers, button-makers, cigar-makers, tobacco-workers, comb-makers and grain-handlers. The proportionate mortality from pulmonary tuberculosis is 24.9 per cent. and from other respiratory diseases 11.3 per cent. Here again we have reason to inquire how to account for the difference between

[1] Jour. Am. Med. Assn., December 12, 1908.

23.3 per cent. in bakers and 37.2 per cent. in tannery finishers, or 36.1 per cent. in cigar-makers.

Vegetable Fiber Dust. Another study deals with 1120 deceased workers, at ages of fifteen years and over, who were exposed to the inhalation of vegetable fiber dust. This group includes furniture finishers and sanders, woodwork finishers, cotton-spinners, knitting-mill employees, lace-, linen-, flax- and other weavers, paper-cutters and rope-makers. The proportionate mortality from pulmonary tuberculosis is 29.1 per cent. and from other respiratory diseases 11.1 per cent. Here again we observe great differences in the percentage of 22.1 from consumption in knitting-mill employees as against 49.2 per cent. in lace-weavers.

Animal and Mixed Fiber Dust. Study No. 4 deals with 1276 deceased workers who were exposed to animal and mixed fiber dust. The occupations included in this group are hatters, upholsterers, carpet-weavers and workers, silk-weavers, woollen-mill employees, fur-workers and mattress-workers. The proportionate mortality from pulmonary tuberculosis is 29.1 per cent. and from other respiratory diseases 11.1 per cent., exactly the same as for vegetable fiber dust.

Mineral Dust. Study No. 5 refers to 3734 deceased workers who were exposed to mineral dust. The occupations included are potters, tile-makers, glass-blowers and cutters, marble-and stone-cleaners, cutters and polishers, core-makers, molders, lapidaries, lithographers, paper-hangers and plasterers.

The proportionate mortality from pulmonary tuberculosis is 29.9 per cent. and from other respiratory diseases 14 per cent. It is important to note that the percentage of deaths from pulmonary tuberculosis, contrary to expectations, is 3.2 per cent. less than in the two preceding groups, which were exposed to vegetable dust and animal and mixed fiber dust, although the percentage of deaths from other respiratory diseases is 3 per cent. greater than in all other groups.

Metallic Dust. Study No. 6 refers to 3374 deceased workers who were exposed to metallic dust. The occupations included are grinders, polishers, cutlery- file- and tool-workers, brass-molders and finishers, gold-beaters, jewellers, gold and silver polishers,

type-founders, engravers, printers and pressmen. The proportionate mortality from pulmonary tuberculosis in this group is 30.3 per cent. and from other respiratory diseases 11.1 per cent.

Recapitulation.	Pulmonary Tubeculrosis. Per cent.	Other Respiratory Diseases. Per cent.
Mortality in 3374 workers exposed to metallic dust	30.3	11.1
Mortality in 1276 workers exposed to animal and mixed fiber dust	29.1	11.1
Mortality in 1120 workers exposed to vegetable fiber dust	29.1	11.1
Mortality in 3734 workers exposed to mineral dust	25.9	14.0
Mortality in 5694 workers exposed to general organic dust	24.9	11.3
Mortality in 10,567 workers exposed to municipal dust	23.8	11.8

The foregoing data undoubtedly point to the fact that exposure to all kinds of dust plays a very important role in the causation of respiratory diseases. Dust containing crystalline silica, such as quartz, quartzite (ganister. buhr stone), flint, sandstone, carborundum and emery is perhaps the most frequent cause of the more acute forms of fibrosis. Even in what is commonly called metallic dust the siliceous particles from grinding and polishing implements are with the possible exception of the red oxide of iron chiefly responsible for the cases of siderosis. All other kinds of dust, however, may and doubtless frequently do produce a milder grade of pneumoconiosis and fibrosis.

Whether or not the lesions thus produced may eventuate in pulmonary tuberculosis depends probably upon a number of factors, the first of which is the presence of tubercle bacilli. Watkins-Pitchford, cited by Landis,[1] found tubercle bacilli in 15.2 per cent. of samples of sputa collected underground in the Transvaal gold mines as against 2.5 per cent. of sputa collected in the homes and places of resort of the workers. Similar investigations in other industries may bring us nearer the truth; but, after all, the danger from droplet infection, the common drinking cup, including the whisky flask, which formerly in the spirit of good fellowship was not infrequently passed from mouth to mouth, and the question of massive infection cannot be underrated.

[1] Journal of Industrial Hygiene, July, 1919, p. 125.

In the light of our knowledge concerning infection in early childhood it is perfectly conceivable that the germs of tuberculosis may remain dormant because of the formation of fibroid tissue, and that the same factors which determine the development of an acute or chronic form of tuberculosis and the reactivation in apparently arrested cases of pulmonary tuberculosis have to be considered. Many of the general predisposing causes calculated to diminish the general power of resistance, and thus create a suitable soil for the development of the disease, have already been alluded to. Personally, I am convinced that exposure to dust alone does not account for the undue prevalence of tuberculosis in certain occupations, and that every factor which undermines the general health of the individual is at least of equal if not greater importance in determining the course of the disease. I have therefore arranged in the following tables the percentage distribution of pulmonary tuberculosis in certain occupations in an ascending

TABLE I.—OCCUPATIONAL MORTALITY STATISTICS PER CENT. DISTRIBUTION WITH SPECIAL REFERENCE TO TUBERCULOSIS.

All occupations.		Tuberculosis.	Pneumonia.	Other respiratory diseases.	Heart diseases.	Diseases of digestive system.
Male	210,507	14.8	8.0	2.2	11.9	2.8
Female	27,459	21.0	7.0	2.2	10.3	3.6
Lumbermen and raftsmen	815	5.6	6.3	0.6	9.0	2.2
Coal miners*	1,557	5.8	10.4	1.1	9.6	
Bankers	712	5.9	10.8	1.0	12.1	2.5
Manufacturers and officials	2,805	6.3	7.2	2.0	13.2	3.5
Farmers, planters and overseers	34,662	6.6	6.6	2.1	16.3	3.8
Physicians and surgeons	1,421	6.6	7.4	1.8	12.7	3.5
Clergymen	1,216	6.6	7.1	2.0	15.5	3.5
Steam rail employees	5,555	7.0	4.3	1.1	5.3	1.3
Lawyers	1,325	7.5	7.9	1.9	12.7	3.1
Farmers, planters and overseers, females	799	7.9	6.9	1.1	14.8	4.0
Officials, government	997	8.6	7.3	1.4	15.3	3.0
Agricultural pursuits, females	879	8.6	6.8	3.1	15.1	4.0
Agricultural pursuits, males	50,844	8.7	7.1	2.2	15.1	3.5
Foremen and overseers	745	8.7	6.8	2.3	11.3	2.6
Watchmen, police and firemen	2,355	8.7	7.9	2.1	14.6	2.1
Miners and quarrymen	5,663	8.8	8.2	4.3	7.1	2.0
Hotel keepers	765	9.3	6.8	1.7	11.2	4.2
Gardners, florists and nurserymen	1,215	9.3	9.1	3.6	14.7	3.6
Farmers and farm laborers*	3,890	9.7	6.2	....	16.5	
Stockraisers, herders and drovers	766	9.8	6.8	2.0	12.0	4.0
Merchants and dealers except wholesale	9,329	9.9	7.0	1.9	13.1	3.3

* Metropolitan Life Insurance Experience 1911–1913.

scale and not according to exposure to the different varieties of dust. I will make such comments as I am able to offer as to the possible influence of physique, standards of living and the effects of alcohol, lead, mercury and other industrial poisons.

Table I deals with 21 occupations; the percentage of deaths from tuberculosis ranges from 5.6 in lumbermen and raftsmen to 9.9 in merchants and dealers. The percentage of 5.8 in coal miners, based upon the experience of the Metropolitan Insurance Company in 1557 deaths, is quite low as compared with 9.7 per cent. given by the Prudential Company in 3658 deaths and 9.2 per cent. as given by Hayhurst,[1] based upon 5428 deaths among Illinois soft-coal miners.

Dr. Hayhurst, in his excellent discussion of the subject, invites attention to the fact that the marked excess in deaths due to violence in mining operation nullifies to a large extent any comparison possible between the other causes of deaths. When in the case of miners he omitted violence as a cause of death and then compared the purely medical causes (with suicide included), he found the percentage of deaths from tuberculosis to be 14.6.

Dr. William H. Davis, the chief statistician for vital statistics of the United States Bureau of Census, cautioned me at the outset of these studies that a proper interpretation of mortality percentage figures by age and occupation can only be made, by constantly keeping in mind the normal death-rates of the various occupations and ages; for example, a low percentage from tuberculosis may not mean an actually lower rate from this disease, but may mean there is an unusually high rate from accidents or some other cause. The violence percentage in steam-railway employees was 53.6 and in lumbermen and raftsmen 29.9, and this accounts for their remarkable low percentage of deaths from tuberculosis in this table and also for the low percentage in miners and quarrymen.

This table shows, however, quite clearly that tuberculosis is infrequent in occupations involving outdoor life, combined with

[1] The Health Hazards and Mortality Statistics of Coal Mining in Illinois and Ohio, Journal of Industrial Hygiene, November, 1919.

muscular activity, but it also shows that it is infrequent in the liberal professions, among bankers, officials, hotel-keepers and shop-keepers, presumably because of higher standards of living.

TABLE II.—OCCUPATIONAL MORTALITY STATISTICS PER CENT. DISTRIBUTION.

All occupations.		Tuberculosis.	Pneumonia.	Other respiratory diseases.	Heart disease.	Diseases of digestive system.
Commercial travellers	542	10.0	5.2	1.2	9.8	3.9
Carpenters and joiners	7,883	10.1	7.1	2.0	14.4	2.7
Puddlers (P)	251	10.4	6.2	....	16.5	....
Agents	2,625	10.4	7.7	1.0	13.0	2.8
Boatmen and sailors	1,757	10.4	7.4	1.7	10.0	1.6
Cabinet makers	632	10.9	5.5	2.9	12.3	3.0
Nurses and midwives	915	11.1	7.8	1.6	11.4	3.6
Railway track and yard workers*	1,932	11.1	6.4	1.3	12.0	
Blacksmiths	2,456	11.4	8.0	2.5	13.8	3.1
Professional service, male	9,214	12.0	7.3	1.0	12.3	2.9
Housewives and housekeepers*	88,151	12.0	6.0	1.4	15.3	
Engineers and firemen, not locomotive	3,295	12.6	7.7	1.9	11.8	2.5
Boot and shoe makers and repairers	2,702	13.4	8.5	2.5	13.7	2.2
Coopers	570	13.7	8.9	4.4	12.6	2.3
Iron ore miners	563	13.7	7.6	9.6		
Janitors and sextons	1,065	13.9	12.6	1.8	13.0	2.5
Masons, brick and stone	2,399	13.9	8.2	2.5	13.2	2.3
Railway engineers and trainmen (P)	947	14.0	5.1	....	5.4	
Agricultural laborers	13,214	14.5	8.4	2.2	12.6	2.8

* Metropolitan Life Insurance Experience 1911–1913.
P. Prudential Industrial Insurance Experience.

Table II deals with 19 occupations, the percentage of deaths from tuberculosis ranging from 10 in commercial travellers to 14.5 in agricultural laborers. The percentage in the latter group appears high when compared with 8.7 per cent. in 50,844 persons engaged in other agricultural pursuits, unless accounted for by lower standards of living. It is rather remarkable that the percentage of tuberculosis in carpenters and carbinet-makers, exposed as they are to a mixture of vegetable and mineral dust in sand-papering, should be about the same as in commercial travellers; we note, however, that the percentage of deaths from digestive diseases in the latter group is quite high, possibly indicating a lower state of nutrition. The percentages in all the other occupations enumerated in this table are below 14.8, which is the average for all occupations in spite of the fact that a number of them are dusty trades.

TABLE III.—OCCUPATIONAL MORTALITY STATISTICS PER CENT. DISTRIBUTION.

All occupations.		Tuberculosis.	Pneumonia.	Other respiratory diseases.	Heart diseases.	Diseases of digestive system.
Teachers and professors, college, male	587	15.0	5.6	1.7	12.6	4.3
Saloonkeepers	973	15.5	8.5	1.6	7.3	2.9
Manufacturer mechanical pursuits	63,880	15.5	7.9	2.4	11.4	2.6
Salesmen	2,550	15.8	7.6	1.0	11.5	2.8
Butchers	1,503	16.2	8.3	1.2	12.0	2.8
Iron and steel workers	2,838	16.3	10.8	1.5	10.0	2.5
Trade and transport workers	44,941	16.6	7.3	1.6	10.2	2.5
Plasterers (P)	977	16.7				
Bakers	952	18.2	8.6	1.9	10.8	2.5
Hucksters and peddlers	799	18.3	9.5	2.1	10.8	2.4
Machinists	3,317	18.3	7.9	1.9	11.1	2.4
Domestic servants and launderesses, female	1,091	18.5	8.7	2.6	11.5	3.9
Domestics, personal service, female	17,735	18.7	7.5	2.3	10.6	3.7
Street railway employees	697	18.9	6.2	1.3	6.3	1.4
Painters, glaziers and varnishers	3,720	18.9	8.0	1.7	10.6	2.4
Tin plate and tin ware workers	681	18.9	8.2	2.5	11.6	2.9
Tailors	2,408	19.0	7.7	3.5	10.5	3.0
Dressmakers	1,019	19.2	7.0	1.3	11.7	2.9
Servants and waitresses	14,930	19.5	7.3	2.3	10.4	3.7
Professional service, female	1,725	19.7	6.9	1.8	8.8	3.5
Domestic and personal service, male	41,624	19.7	10.2	2.2	10.4	2.5
Laborers, not specified	29,345	19.9	11.0	2.4	10.1	2.5

P. Prudential Industrial Insurance Experience, 1911–1913.

Table III includes 22 occupations; the percentage of deaths from tuberculosis varies from 15 in college professors and teachers to 19.9 in day laborers. The percentage in female college professors and teachers is 21.5. Both are usually recruited from weak stock, and the high percentage of diseases of the digestive organs in both sexes is indicative of a low state of nutrition. The rates suggests the need of improvement in personal hygiene and the sanitation of class-rooms. The percentage in saloon-keepers is 15.5 as compared with 9.3 in hotel-keepers and 26 per cent. in innkeepers and bartenders. The conclusion seems irresistable that chronic alcoholism plays an important role in the latter group. Butchers and steel-workers have about the same percentage in tuberculosis, but the steel-workers have a higher pneumonia rate. Butchers have a high venereal rate and are often alcoholic. In painters and tinware-workers the element of chronic lead poisoning should be considered. The percentage of deaths from tuberculosis

in tailors and dressmakers is almost the same. Exposure to a mixture of vegetable and animal dust and a postural influence may be discerned, since finishers (among males) show the greatest percentage of faulty postures. The rates for servants and laborers are above the average, and are doubtless influenced by exposure to dust and also by alcohol.

TABLE IV.—OCCUPATIONAL MORTALITY STATISTICS PER CENT. DISTRIBUTION.

All occupations.		Tuber-culosis.	Pneu-monia.	Other respiratory diseases.	Heart diseases.	Diseases of digestive system.
Engravers (P)	112	20.5	2.7	0.9		
Hostlers	540	20.6	13.9	0.8	12.2	2.0
Cotton mill operatives	686	21.1	6.9	2.0	11.5	3.5
Textile mill workers	2,390	22.0	5.9	....	10.7	
Teachers and professors colleges, female	1,170	21.5	8.0	1.6	8.4	3.5
Painters and paperhangers*	2,722	21.9	6.1	....	10.7	
Iron molders*	1,646	21.9	10.6	....	13.1	
Bookkeepers and accountants	1,740	22.5	6.1	1.5	12.5	2.2
Musicians and teachers of music	509	23.4	6.8	1.9	11.0	2.5
Draymen, hackmen and teamsters	5,791	23.4	9.2	1.7	9.6	2.2
Barbers and hairdressers	1,398	23.9	6.2	1.4	10.7	2.5
Electricians	776	24.1	6.8	1.0	5.4	1.3
Seamstresses	695	24.2	6.9	2.4	10.2	4.5
Tobacco, cigar operatives	982	24.3	6.1	1.7	10.1	2.3
Machinists*	3,152	25.0	7.1	....	11.1	

* Metropolitan Life Insurance Experience 1911–1913.
P. Prudential Industrial Insurance Experience.

Table IV includes 15 occupations with a percentage of deaths varying from 20.5 in engravers to 25 per cent. in machinists. Steel-engravers are exposed to mercury, electricians to lead and mercury and painters and machinists (in certain processes) to lead. In the case of textile workers, bookkeepers, accountants, teachers, musicians and tobacco-workers it is fair to assume that the majority are recruited from feeble stock, as shown by very high rates before the completion of the twenty-fifth year. In some of these industries, notably in the textile mills and tobacco factories, special investigations should be made as to the character of dust and whether or not tubercle bacilli are found. Heucke[1] claims to have found 0.56 per cent. of nicotin in the dust of different tobacco establishments.

[1] Cited by Stephani: Weyl's Handbuch der Arbeiterkrankheiten, Jena, 1908, pp. 634 and 635.

Barbers and hair-dressers are frequently exposed to droplet infection and also to inhalation of fine hair. The percentage of of deaths from tuberculosis in hostlers is 20.6 and from pneumonia 13.9 per cent. as compared with 9.8 per cent. and 6.8 per cent. in stock-raisers, herders and drovers. Inasmuch as the pneumonia rate among cavalry troops is quite generally in excess of other arms of the service, it occurred to me during my army experience that the inhalation of the peculiar character of dust given off during the grooming of horses might be a factor in this increased susceptibility. The high rates in draymen, hackmen and teamsters are usually attributed to exposure to weather without opportunity for active exercise; they have, however, also a high rate for alcoholism. In Great Britain the rate for private coachmen is much lower, probably because of the better habits and living conditions. Iron-molders have a high rate of alcoholism and are more or less exposed to dust and also to carbon monoxide.

TABLE V.—OCCUPATIONAL MORTALITY STATISTICS PER CENT. DISTRIBUTION.

All occupations.		Tuber-culosis.	Pneu-monia.	Other respiratory diseases.	Heart diseases.	Diseases of digestive system.
Saloonkeepers and bartenders*	2,190	26.0	8.7	....	8.3	
Manufacturers and mechanical pursuits, female	4,582	27.4	6.1	1.3	10.3	2.9
Servants and waiters	3,017	27.6	8.0	1.8	10.3	2.4
Dressmakers and garment workers*	2,172	27.8	5.7	....	12.6	
Bartenders	1,115	27.9	11.0	1.6	8.3	2.3
Teamsters, drivers and chauffeurs*	6,471	28.2	8.5	....	9.7	
Clerks and copyists	7,384	28.3	7.3	1.6	8.6	2.1
Porters and helpers in stores	1,253	28.3	11.7	2.3	10.8	2.3
Marble and stone-cutters (P)	822	28.6	7.9	4.2	10.0	1.0
Plumbers, gas- and steam-fitters	1,178	29.2	8.7	1.6	9.3	2.6
Printers, lithographers and pressmen	1,490	29.2	7.5	1.6	9.0	2.2
Longshoremen and stevedores*	651	29.2	8.3	....	12.6	

P. Prudential Industrial Insurance Experience.
* Metropolitan Life Insurance Experience 1911–1913.

Table V includes 12 occupations and the percentage of deaths from tuberculosis varies from 26 in saloon-keepers and bartenders to 29.2 in longshoremen and stevedores, in both of these widely differing occupations as also in teamsters, drivers and chauffeurs

the influence of alcohol is apparent. My impression is that chauffeurs if placed in a separate class would probably show a lower percentage, as they are usually men of good stock and habits; they are however frequently exposed to carbon-monoxide poisoning.

The high percentage of 27.6 in male servants and waiters against a percentage of 19.5 in female servants and waitresses may be accounted for by the percentage of alcoholism, which was 0.2 per cent. in females and 1.8 per cent. in male servants. Females, on the other hand, have a much higher rate from tuberculosis than males, in the manufacturing and mechanical pursuits or those engaged as bookkeepers and accountants, clerks and copyists and garment workers. The high percentage in porters and helpers in stores may in part be accounted for by exposure to a mixed variety of dust, and possibly infected dust; their rate for alcoholism is, however, far above the average. The high percentage in marble- and stone-cutters is doubtless influenced by exposure to mineral dust.

The percentage of tuberculosis in plumbers, gas-and steam-fitters, and n the printing industry are exactly the same. The influence of a subtle form of lead poisoning is apparent in both occupations, but appears to me more pronounced in plumbers. While it is true that many men of feeble stock enter the printing trades, the same cannot be said of plumbers, gas- and steam-fitters. Alcoholism is charged with a percentage of 1.1 per cent. in printers and 0.9 per cent. in plumbers.

TABLE VI.—OCCUPATIONAL MORTALITY STATISTICS PER CENT. DISTRIBUTION.

All occupations.		Tuberculosis.	Pneumonia.	Other respiratory diseases.	Heart diseases.	Diseases of digestive system.
Trade and transportation, female	2,538	30.9	5.4	1.5	7.7	3.7
Brass workers (P)	201	31.8	9.0	2.0		
Clerks and copyists, females .	844	31.9	6.2	1.2	6.4	3.6
Metal polishers and buffers (P)	242	31.9	12.9	....	12.9	
Textile workers, female* . .	1,742	35.5	4.1	....	8.8	
Store clerks and saleswomen* .	794	38.7	3.9	....	7.7	
Clerks, bookkeepers and office assistants, female* . . .	1,235	42.4	3.6	....	8.1	

* Metropolitan Life Insurance Experience 1911–1913.
P. Prudential Industrial Insurance Experience.

Table VI includes 7 occupations and the percentage of deaths from tuberculosis varies from 30.9 in females engaged in trade and transportation (as compared with 16.6 per cent. in males) to 42.4 per cent. in female clerks, bookkeepers, and office assistances (as compared with 22.5 per cent. in men). Lead and mixed mineral and metallic dust doubtless play a role in brass-workers, metal-polishers and buffers. The percentage from tuberculosis in female textile-workers is 35.5 against 21.1 per cent. in males. The percentage in clerks and saleswomen is 38.7 (as compared with 15.8 per cent. in salesmen). The question of physique, race and nationality and many other factors doubtless influence these differences.

Table VII covers 57 industries or occupations, which because not specifically enumerated in the foregoing tables, or because of differences in percentage, are here presented. With few exceptions the data are based upon the experience of the Prudential Insurance Company or collected by Dr. F. L. Hoffman.[1]

Many of these occupations have already been commented upon. The low figures for furnace-tenders in steel plants may be due to a more rapid labor turn-over. Puddlers are recruited from a very sturdy stock. Core-makers are exposed not only to dust, but also to carbon monoxide, from open wood or coke fires or red-hot cast-iron stoves. Artificial-flower makers were formerly exposed to lead and arsenite of copper; anilin colors have replaced to a great extent the latter coloring agent. Gold-leaf workers have also in Europe a very high mortality rate from respiratory diseases. It is possible that the copper and zinc contained in the alloy may exert a toxic effect. Carpet-weavers, upholsterers, weavers, hatters, tanners, spinners, silk-weavers and lace-workers show a mortality percentage which is double and in some instances more than treble the average for all occupations. The rate for tanners is unusually high, as the occupation calls for strength and endurance. The handling of the dry hides involves inhalation of more or less dust of an animal and inorganic origin and fragments of hair.

[1] Mortality from Respiratory Diseases in Dusty Trades, Bull. U. S. Bureau of Labor Statistics, No. 231, June, 1918.

TABLE VII.—PERCENTAGE OF DEATHS FROM TUBERCULOSIS IN CERTAIN OCCUPATIONS BASED UPON THE INDUSTRIAL EXPERIENCE OF THE PRUDENTIAL INSURANCE COMPANY OF AMERICA 1907–1912.

Occupations.	Total deaths.	Tuberculosis. Per cent.
Furnace tenders in steel works	62	6.5
Coal miners	3,658	9.7
Street cleaners	197	12.9
Brick and tile makers	133	12.0
Slaters	93	13.7
Quarry workers	149	14.8
Blacksmiths*	1,273	14.8
Heaters in steel plants	5	15.7
Rollers	112	17.9
Miscellaneous employees in steel plants	68	20.6
Cement—lime workers	222	20.7
Knitting mill employees	103	22.1
Laborers iron—steel plants	2,788	22.5
Iron—steel workers	1,341	22.6
Street car employees	1,088	25.7
Stove mounters and grinders	....	27.9
Draymen and teamsters	9,799	29.4
Coremakers	357	29.4
Artificial flower makers, male	13	30.8
Glass workers	336	30.9
Gold leaf beaters	53	32.0
Pressmen	224	32.6
Carpet weavers	101	32.7
Coachmen	337	33.1
Upholsterers	400	33.6
Painters	1,056	34.1
Shoe factory employees	....	34.5
Potters	267	34.6
Weavers	587	34.7
Cigar makers	....	36.1
Glass blowers	197	36.3
Printers	1,733	37.3
Hatters	529	36.6
Glass cutters	220	36.4
Tanners	192	37.2
Polishers, grinders iron and steel	136	37.5
Stone cutters	616	37.6
Copper miners	611	37.9
Lithographers	325	38.3
Granite—stone cutters	204	39.2
Jewellers	361	42.3
Spinners	144	42.5
Polishers and grinders—iron—steel	138	42.9
Sheffield metal grinders	2,640	43.0
Brass workers	95	43.7
Silk weavers	137	44.5
Polishers and finishers in brass	143	45.2
Tile makers	62	45.3
Lead and zinc ore miners	96	49.0
Lace workers	31	49.2
Slate pencils workers (1)	260	64.2
Flint Knappers and Buhrstone dressers (1)	....	77.8

* Metropolitan Life Insurance Company. (1) German and English (Hoffman).

In certain of the tanning and dressing processes there is exposure to disulphide of arsenic, chromates, lead, benzine and amyl acetate. The rate for hatters is also very high and cannot be wholly attributed to the volume or the character of the dust; indeed, some of the processes are carried on in a dust-free atmosphere. It has been held for some time that the chief danger in this industry is exposure to the inhalation of nitrate of mercury which is employed in the "carrotting" process, and in the opinion of Dr, Legge[1] forms an insoluble compound with the keratin in the hair and is not removed in the subsequent process of the felt-hat industry. The men who make the solution and those who apply it are exposed not only to mercurial but also to nitrous fumes, and all others engaged in certain dusty processes are exposed to the inhalation of dust impregnated with particles of nitrate of mercury. The stovers, who handle the hard felt shapers at a temperature of 180° F. in the drying department, are exposed not only to mercurial vapors, but also in some establishments to the fumes of wood alcohol, employed in the shellacing process to stiffen the hats, which doubtless exerts a toxic effect on the system. There is also danger in some establishments from arsenical poisoning, since, according to Heinzerling and Lewin,[2] the fleshy part of hare and rabbit skins is not infrequently treated with a soap containing arsenite of potassium or sodium.

The excessive rates in glass-workers, potters, file-makers and brass-workers are likewise influenced not only by the character of the dust but by exposure to lead. The rates for copper-miners, lead- and zinc-ore miners are also very high. This may be due to the high percentage of crystalline silica content in the dust of some of the mining districts, but since the percentage of deaths is very much lower in gold-quartz miners we strongly suspect that lead and copper may exert a toxic effect on the system in this class of miners.

The percentage for slate-pencil workers is exceedingly high. They are quoted by Hoffman from Sommerfeld and apply to a

[1] Oliver's Dangerous Trades.
[2] Cited by Schütte: Weyl's Handb. der Arbeiterkrankheiten, Jena, 1908, p. 386.

class of workers whose physical and social economic conditions are notoriously low; one-third of the workers were children below the age of fourteen. The mortality from tuberculosis is also high for slate-workers in Wales. A British Commission found that pure slate dust was rarely met with, but, as a rule, the dust included a considerable proportion of minute particles of adherent quartz.

The percentage of tuberculosis in lace-workers is very high; in Great Britain it is somewhat below the average. It is quite possible that the dust inhaled during the making of linen lace is more injurious, because Greenhow as early as 1865 has shown that flax dust contains silica. Excessive heat and humidity are injurious factors in some of the departments, and, according to Arlidge, exposure to coal gas from gas-heated stoves in the process of "gauffering" is not infrequent. There is likewise danger from lead poisoning in workers in lace and silk weighted with lead acetate.

TABLE VIII.—AVERAGE AGE AT DEATH, BY OCCUPATION—MALE.*

	Average age at death.
Bookkeepers and office assistants	36.5
Enginemen and trainmen (railway)	37.4
Plumbers, gas fitters, and steam fitters	39.8
Compositors and printers	40.2
Teamsters, drivers and chauffeurs	42.2
Saloonkeepers and bartenders	42.6
Machinists	43.9
Longshoremen and stevedores	47.0
Textile-mill workers	47.6
Iron molders	48.0
Painters, paper hangers, and varnishers	48.6
Cigar makers and tobacco workers	49.5
Bakers	50.6
Railway track and yard workers	50.7
Coal miners	51.3
Laborers	52.8
Masons and bricklayers	55.0
Blacksmiths	55.4
Farmers and farm laborers	58.5
All occupations	47.9

AVERAGE AGE AT DEATH, BY OCCUPATION—FEMALE.*

Clerks, bookkeepers, and office assistants	26.1
Store clerks and saleswomen	28.0
Textile-mill workers	33.9
Dressmakers and garment workers	42.0
Domestic servants	49.1
Housewives and housekeepers	53.3
All specified occupations	51.1

* Based upon the Experience of the Metropolitan Insurance Company, Industrial Department, 1911–1913, by Louis I. Dublin, Ph.D.

Fortunately the effects of legislation and factory sanitation, together with the gospel of personal hygiene and higher standards of living conditions which have been emphasized in the educational campaign against the great white plague, are strikingly shown by a most marked decrease in the mortality from tuberculosis in eight of the so-called dangerous trades in the State of New Jersey.

Dr. F. S. Crum, assistant statistician of the Prudential Insurance Company, has kindly furnished me with data, relating to occupations in the State of New Jersey. The table shows that the mortality from tuberculosis in hatters has been reduced from 29.7 per cent. in the period of 1909–1913 to 23.6 per cent. in the period of 1914–1918; the pneumonia rate during the same period has been reduced from 8.5 to 7 per cent., and other respiratory diseases from 4.9 to 2.3 per cent. In stone-cutters the percentage of deaths from tuberculosis during the same period has been reduced from 26.3 to 19.7 per cent. In metal-grinders from 39.2 to 29.1 per cent., in molders, founders and casters from 19.7 to 17.4 per cent., in other iron- and steel-workers from 24 to 17.2 per cent. and in plumbers from 32.5 to 22.6 per cent. There was no decrease in the textile industry, the rate in the period 1909–1913 being 21.3 per cent. and in 1914–1918 it was 21.7 per cent.

In potters there was an increase in the percentage of tuberculosis from 32.4 (1907–1913) to 36.6 per cent. during the period from 1914–1918. This increase fortunately does not indicate an increased hazard, for by reference to the tables it will be noted that there was a distinct decrease at ages between ten and thirty-nine, showing that the protective measures are really effective in all newcomers, but they could not avert the damage inflicted in the older workers before the adoption of the present safeguards.

It is less than fifteen years since attention has been paid to industrial hygiene in this country, but in view of what has been accomplished during that brief period I venture to predict that no country will make greater progress in social and industrial betterment than our own beloved United States.

In the meantime no opportunity should be lost in the general campaign to emphasize the importance of personal hygiene and

TABLE IX.—PROPORTIONATE MORTALITY IN SPECIFIED INDUSTRIES FROM TUBERCULOSIS OF THE LUNGS, NEW JERSEY, 1909–1918.

Ages.	1909–1913, deaths from		Percentage *b* of *a*.	1914–1918, deaths from		Percentage *b* of *a*.	Per cent. increase or decrease.
	(*a*) All causes.	(*b*) Tuberculosis of the lungs.		(*a*) all causes.	(*b*) Tuberculosis of the lungs.		
HATTERS							
10 to 19	3	2	66.7	27	8	29.6	−55.6
20 to 29	44	28	63.6	65	22	33.8	−46.9
30 to 39	69	49	71.0	74	23	31.1	−56.2
40 to 49	117	42	35.9	84	27	32.1	−10.6
50 to 59	102	16	15.7	88	28	31.8	+102.5
60 and over	150	7	4.7	134	3	2.2	−53.2
Total ages 10 and over	485	144	29.7	472	111	23.5	−20.9
TEXTILE INDUSTRIES							
10 to 19	75	31	41.3	85	23	27.1	−34.4
20 to 29	183	84	45.9	226	76	33.6	−26.8
30 to 39	159	48	30.2	245	89	36.3	+20.2
40 to 49	189	36	19.0	209	52	24.9	+31.1
50 to 59	161	20	12.4	223	34	15.2	+22.6
60 and over	298	8	2.7	550	12	3.6	+33.3
Total ages 10 and over	1065	227	21.3	1518	286	21.7	+1.9
METAL GRINDERS							
10 to 19	4	...	....	4			
20 to 29	23	14	60.9	39	14	35.9	−41.1
30 to 39	39	19	48.7	66	29	43.9	−9.9
40 to 49	44	19	43.2	53	17	32.1	−25.7
50 to 59	21	5	23.8	55	13	23.6	−0.8
60 and over	22	3	13.6	44	3	6.8	−50.0
Total ages 10 and over	153	60	39.2	261	76	29.1	−25.8
MOLDERS, FOUNDERS AND CASTERS							
10 to 19	4	1	25.0	4	...	....	−100.0
20 to 29	42	16	38.1	45	14	31.1	−18.4
30 to 39	57	21	36.8	83	18	21.7	−41.0
40 to 49	65	11	16.9	101	21	20.8	+23.1
50 to 59	56	8	14.3	99	15	15.2	+5.3
60 and over	90	5	5.6	110	9	8.2	+46.4
Total ages 10 and over	314	62	19.7	442	77	17.4	−11.7
STONE CUTTERS							
10 to 19	2	...	....	4			
20 to 29	6	2	33.3	17	3	17.6	−47.1
30 to 39	29	13	44.8	19	5	26.3	−41.3
40 to 49	39	13	33.3	44	11	25.0	−24.9
50 to 59	67	19	40.4	51	17	33.3	−17.6
60 and over	67	3	4.5	93	9	9.7	+115.6
Total ages 10 and over	190	50	26.3	228	45	19.7	−25.1

TABLE IX—Continued.

Ages.	1909–1913, deaths from		Percentage *b* of *a*.	1914–1918, deaths from		Percentage *b* of *a*.	Per cent. increase or decrease.
	(*a*) all causes.	(*b*) Tuberculosis of the lungs.		(*a*) all causes.	(*b*) Tuberculosis of the lungs.		
			POTTERS				
10 to 19	10	5	50.0	7	1	14.3	−71.4
20 to 29	50	22	44.0	47	19	40.4	−8.2
30 to 39	69	39	56.5	72	32	44.4	−21.4
40 to 49	108	33	30.6	104	47	45.2	+47.7
50 to 59	71	20	28.2	105	31	29.5	+4.6
60 and over	75	5	6.7	72	19	26.4	+294.0
Total ages 10 and over	383	124	32.4	407	149	36.6	+13.0
			IRON AND STEEL WORKERS				
10 to 19	35	7	20.0	20	3	15.0	−25.0
20 to 29	148	65	43.9	210	51	24.3	−44.6
30 to 39	264	102	38.6	299	69	23.1	−40.2
40 to 49	242	67	27.7	268	63	23.5	−15.2
50 to 59	220	29	13.2	234	26	11.1	−15.9
60 and over	264	11	4.2	287	15	5.2	+23.8
Total ages 10 and over	1173	281	24.0	1318	227	17.2	−28.8
			PLUMBERS				
10 to 19	14	1	7.1	28	4	14.3	+101.4
20 to 29	99	51	51.5	162	36	22.2	−56.9
30 to 39	135	55	40.7	195	54	27.7	−31.0
40 to 49	118	35	29.7	178	48	27.0	−9.1
50 to 59	59	11	18.6	123	36	29.3	+57.5
60 and over	70	8	11.4	115	3	2.6	−77.2
Total ages 10 and over	495	161	32.5	801	181	22.6	−30.5

general sanitation, for be it remembered that every movement which makes for better health and a temperate, untainted, and virile race will offer the best safeguard in the prevention of tuberculosis. When we supply our children with healthful school-rooms and teach them the value of pure air, sanitary homes, of proper and sufficient food, of physical culture, baths and suitable clothing and the importance of pure, clean lives, the lessons taught will be applied in the homes and workshops of the nation.

LIST OF PRIZES AND LECTURES

THE WILLIAM F. JENKS MEMORIAL PRIZE

(Triennial)

1889	John Strahan, M.D.	Belfast (Ireland).
1895	Abram Brothers, M.D.	New York.

Note—June 12, 1900, the William F. Jenks Memorial Prize Fund was transferred to the Library as the "William F. Jenks Memorial Library Fund."

ALVARENGA PRIZE OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

(Annual)

1890	R. W. Philip, M.D.	Edinburgh (Scotland).
1891	L. Duncan Bulkley, M.D.	New York.
1892	R. H. L. Bibb, M.D.	Saltillo.
1894	G. E. de Schweinitz, M.D.	Philadelphia.
1895	Guy Hinsdale, M.D.	Philadelphia.
1897	Joseph Collins, M.D.	New York.
1898	S. A. Knopf, M.D.	New York.
1899	Robert Randolph, M.D.	Baltimore.
1900	David de Beck, M.D.	Cincinnati.
1901	George W. Crile, M.D.	Cleveland.
1903	William S. Carter, M.D.	Galveston.
1905	D. Chalmers Watson, M.D.	Edinburgh (Scotland)
1907	William Louis Chapman, M.D.	Providence.
1908	William T. Shoemaker, M.D.	Philadelphia.
1910	M. Katzenstein, M.D.	Berlin (Germany).
1911	Francis D. Patterson, M.D.	Philadelphia.
1914	H. B. Sheffield, M.D.	New York.
1915	J. E. Sweet, M.D.	Philadelphia.
1917	Wilburt C. Davison, M.D.	Baltimore.

NATHAN LEWIS HATFIELD PRIZE FOR ORIGINAL RESEARCH IN MEDICINE

(Triennial)

1901	Henry F. Harris, M.D.	Atlanta.
1909	Martin Henry Fischer, M.D.	Oakland.
1917	A. B. Macallum, M.D., F.R.S.	Toronto.
1919	Harvey Cushing, M.D.	Boston.

NOTE.—November 29, 1913, by Supplemental Deed of Trust, the title of this Fund was changed to "Nathan Lewis Hatfield Prize and Lectureship."

WEIR MITCHELL LECTURES

Jan. 17, 1911	Arthur R. Cushny, M.D.	London.
Mar. 30, 1911	Edmund B. Wilson, Ph.D., LL.D.	New York.
May 16, 1911	Svante Arrhenius	Stockholm.
Nov. 3, 1911	William T. Porter, M.D.	Boston.
Mar. 29, 1912	William H. Howell, M.D.	Baltimore.
Oct. 21, 1912	G. H. F. Nuttall, F.R.S., M.D.	Cambridge (England).
April 4, 1913	H. P. Armsby, Ph.D., LL.D.	Pennsylvania.
Feb. 25, 1914	Harvey Cushing, M.D.	Boston.

PUBLIC LECTURES

Feb. 16, 1910	S. Weir Mitchell, M.D.	Philadelphia.
Nov. 17, 1910	Simon Flexner, M.D.	New York.
Dec. 15, 1910	William H. Welch, M.D.	Baltimore.
April 18, 1911	James G. Mumford, M.D.	Clifton Springs, N. Y.
Nov. 20, 1911	Talcott Williams, A.M., LL.D., Litt.D.	Philadelphia.
April 29, 1912	Owen Wister, A.M., LL.D.	Philadelphia.
Feb. 17, 1913	John K. Mitchell, M.D.	Philadelphia.
Feb. 15, 1916	Daniel J. McCarthy, M.D. and Walter Estell Lee, M.D.	Philadelphia.
April 15, 1916	Surgeon A. M. Fauntleroy	U. S. Navy.

MARY SCOTT NEWBOLD LECTURES

Mar. 29, 1917	A. T. McCormack, M.D.	Bowling Green, Ky.
April 4, 1919	Colonel Thomas W. Salmon, M.C., U. S. Army.	

MÜTTER LECTURES

1865	J. H. Packard, M.D.	Philadelphia.
1866	J. H. Packard, M.D.	Philadelphia.
1867	J. H. Packard, M.D.	Philadelphia.
1868	Harrison Allen, M.D.	Philadelphia.
1869	J. H. Brinton, M.D.	Philadelphia.
1872	J. da S. Solis Cohen, M.D.	Philadelphia.
1879	S. W. Gross, M.D.	Philadelphia.
1882	E. O. Shakespeare, M.D.	Philadelphia.
1885	H. F. Formad, M.D.	Philadelphia.
1888	O. H. Allis, M.D.	Philadelphia.
1890–1891	Roswell Park, M.D.	Buffalo.
1893–1894	De Forrest Willard, M.D., and Guy Hinsdale, M.D.	Philadelphia.
1896	O. H. Allis, M.D.	Philadelphia.
1899–1900	J. B. Roberts, M.D.	Philadelphia.
1901	H. W. Cushing, M.D.	Boston.
1902	L. A. La Garde, M.D.	Washington.
1903	C. N. B. Camac, M.D.	New York.
1904	G. H. Monks, M.D.	Boston.
1905	A. O. J. Kelly, M.D.	Philadelphia.
1906	W. J. Mayo, M.D.	Rochester, Minn.
1907	J. Rogers, M.D., and S. P. Beebe, M.D.	New York.
1908	G. W. Crile, M.D.	Cleveland.
1909	H. D. Fry, M.D.	Washington.
1910	T. W. Hastings, M.D.	New York.
1911	C. F. Nassau, M.D.	Philadelphia.
1912	J. C. Bloodgood, M.D.	Baltimore.
1913	R. C. Coffey, M.D.	Portland, Ore.
1914	F. H. Albee, M.D.	New York.
1915–1916	Rudolph Matas, M.D.	New Orleans, La.
1916	Nelson M. Percy, M.D.	Chicago, Ill.
1917	Chevalier Jackson, M.D.	Philadelphia.
1919	Alexis V. Moschcowitz, M.D.	New York.

WEIR MITCHELL ORATION

1919	Charles W. Burr, M.D.	Philadelphia.

ANNUAL REPORT OF THE LIBRARY COMMITTEE FOR 1919

Mr President: In accordance with the ordinances and By-Laws of the College, I herewith submit the following report of the Library Committee for the year 1919:

Total number of volumes in the Library, including the bound volumes and 16,019 unbound "Reports" and "Transactions"	122,704
Number of unbound "Theses" and "Dissertations"	9,643
Number of unbound pamphlets	104,644

Included in the above are 3,608 volumes known as "Reserves," consisting of second copies of some of the more important periodical publications; also 3,041 volumes more or less incomplete.

The duplicates which are not included in the above total, number 7,192 at this date.

The following table shows the number of volumes in the various divisions of the Library:

	Bound.	Incomplete and unbound.	Total.
General Library	86,206	2,967	89,173
Lewis Library	13,669	44	13,713
On permanent deposit:			
S. D. Gross Library	3,579	3	3,582
Library of the Obstetrical Society of Philadelphia	217	0	217
			106,685

Received during the year from all sources, 4094 volumes, 12,503 pamphlets and 13,693 numbers of various periodicals.

Divided as follows:

	Volumes.	Pamphlets.	Journals.
General Library	3,163	12,425	13,476
Lewis Library	23		
S. D. Gross Library	7		
By purchase from General Account	287		
In exchange	614	78	217
	4,094	12,503	13,693

Accessions (including 81 volumes of "reserves"):

General Library	2,328
Lewis Library	23
S. D. Gross Library	7
	2,358

Total increase in number of volumes for the year: 2,358.

Photographs received in response to requests sent out during the past year:

Fellows of the College, 4. Other than Fellows, 143
For the "War Album," Fellows of the College, 13.
Total number of portraits listed, 9,281.

The individual "donors" for the year ending November 1, 1919 number 463; this represents 1,004 distinct presentations. Each gift is duly acknowledged and properly recorded.

The following list shows the donation of twenty volumes or more, and the number of volumes presented by the various publishing houses:

	Volumes.
Dr. George W. Norris	449
Estate, Wm. C. Goodell	336
Dr. John M. Baldy	217
Mrs. H. Augustus Wilson	152
Dr. Ernest H. Goodman	102
Dr. Thomas H. Fenton	82
Dr. D. Robley Newton	77
Dr. John B. Roberts	55
Dr. Astley P. C. Ashhurst	41
Mrs. Joseph P. Remington	36
Dr. Hobart A. Hare	32
Mrs. Samuel G. Dixon	31
Miss Marion Rowe	31
Dr. Francis D. Patterson	25

From the publishing houses of:

P. Blakiston's Son & Co.	35
F. A. Davis Co.	11
Lea & Febiger	26
J. B. Lippincott Co.	25
W. B. Saunders Co.	33
William Wood & Co.	4

The Library is indebted for large gifts of pamphlets and unbound periodicals to the following donors:

Dr. Lewis H. Adler
Dr. Astley P. C. Ashhurst
Dr. J. Harold Austin
Dr. John M. Baldy
Dr. Charles Baum
Dr. Weston D. Bayley
Messrs. P. Blakiston's Son & Co.
Dr. Charles W. Burr
Dr. Burton Chance
Dr. S. Solis Cohen
Dr. John M. Cruice
Estate, Dr. Roland G. Curtin
Dr. Edward P. Davis
Dr. L. Walter Deichler
Dr. W. A. Newman Dorland
Dr. Charles W. Dulles
Dr. Augustus A. Eshner
Dr. Thomas H. Fenton
Dr. Henry M. Fisher
Dr. R. Max Goepp
Estate, Wm. C. Goodell
Dr. Ernest H. Goodman
Dr. J. P. Crozer Griffith
Dr. S. McC. Hamill
Dr. Alfred Hand
Dr. Hobart A. Hare
Dr. Frederick P. Henry
Dr. Addinell Hewson
Dr. William W. Keen
Dr. H. R. M. Landis
Dr. Morris J. Lewis
Messrs. J. B. Lippincott Company
Dr. F. Hurst Maier
Dr. George M. Marshall
Dr. George W. Norris
Dr. Francis R. Packard
Dr. George E. Pfahler
Dr. John H. W. Rhein
Dr. David Riesman
Dr. John B. Roberts
Messrs W. B. Saunders Company
Dr. Albert C. Sautter
Dr. George E. deSchweinitz
Dr. Joseph D. Seiberling
Dr. J. Madison Taylor
Dr. T. Turner Thomas
Dr. Henry W. Wharton
Dr. Courtland Y. White
Dr. James C. Wilson
Dr. Mason W. Zimmerman

687 new publications were added to the Library during the past year; 35 of these works were written or edited by Fellows of the College.

17 volumes were presented by the following authors or editors:

Dr. Thomas L. Bradford
Dr. Albert P. Brubaker
Dr. Wilburt C. Davison
Dr. Charles W. Dulles
Mr. Howard S. Eckels
Dr. John W. Farlow
Dr. Alfred Gordon
Dr. Hobart A. Hare (Editor)
Dr. Chevalier Jackson
Dr. Isaac H. Jones
Dr. Henry E. Radasch
Dr. Benjamin M. Ricketts
Dr. John B. Roberts
Dr. Penn G. Skillern, Jr.

6 volumes were sent by the publishers at the request of the following authors or editors:

Dr. John C. DaCosta, Jr. (editor)
Dr. Herbert Fox
Dr. William Campbell Posey
Dr. Horatio C. Wood
Dr. Hobart A. Hare

Summary of the "Funds."

	Volumes purchased.	Cost.
Henrietta Rush Fales Baker Fund	34	$125.99
Luther S. Bent Fund	5	4.29
William T. Carter Fund	14	48.36
Gerardus Clarkson Fund	1	2.47
Francis X. Dercum Fund	39	130.62
Louis A. Duhring Fund	10	63.36
John D. Griscom Fund	61	102.51
William F. Jenks Fund	35	138.34
Oliver A. Judson Fund	1	1.59
William V. and John M. Keating Fund	8	26.60
William W. Keen Fund	28	81.72
Library Endowment Fund	40	255.91
Horace Magee Memorial Fund	187	565.22
J. Ewing Mears Fund	54	225.43
Charles K. Mills Fund	2	5.18
Weir Mitchell Fund	9	68.67
John H. Musser Fund	6	10.49
Elizabeth K. Newcomet Fund	20	44.77
William F. Norris Fund	18	59.57
Charles A. Oliver Fund	6	31.38
Philadelphia Medical Society Fund	4	13.85
Lewis Rodman Fund	21	89.37
Douglas Stockton Warren Fund	29	55.87
John F. Weightman Fund	3	15.27
Caspar Wistar Fund	29	64.49
	664	$2,231.21

Special Accounts:

	Volumes purchased.	Cost.
Fund for completing files of journals . . .	51	$243.56
Fund for rare and valuable books	141	3,638.52
S. D. Gross Library Account	6	9.68
	198	$3,891.76

George B. Wood Fund for Library supplies, stationery, etc., expended $354.44.

Morris Longstreth Library Fund, expended on account of salaries, $1,036.62.

Catalogue Endowment Fund, expended on account of salaries, $42.50.

Louis A. Duhring Fund, for the general purposes of the Library, expended $10,097.09.

	1919.	1918.	Increase.
Books bound	1,257	952	305

	1919.	1918.	Increase.
Number of visitors to the Library	3,088	3,050	38

	1919.	1918.	Increase.
[Fellows of the College . .	1,220	1,196]	24

The Library has been kept open two evenings each week and on the six minor legal holidays, for the same hour and period of time, as during the past year.

	1919 (75 evenings).	1918 (78 evenings).	Decrease.
Visitors, evening	298	314	16

	1919.	1918.	Increase.
[Fellows of the College .	111	96]	15

	1919.	1918.	Increase.
Visitors, legal holidays . .	49	51	2
[Fellows of the College .	9	11]	2

The above figures are included in the total number of visitors for the year.

	1919.	1918.	Increase.
Number of books consulted in the Library	13,008	6,892	6,116

The number of books reported as "consulted in the Library" includes only those supplied on demand. Readers have access to the bound volumes of periodicals and works of reference kept on the shelves in the Reading Room, and the Fellows have access to the Book-Stacks. There are, therefore, a great many volumes consulted of which no accurate record can be kept.

	1919.	1918.	Decrease.
Number of books taken out	1,956	2,106	150

Use of Study-rooms: Average number of rooms in use throughout the year: 4. Greatest number in use in any one month: 7. Daily average of the number of volumes in use in these rooms: 96.

	Works.	Volumes.	Cards written.	Printed cards revised and filed.
Cataloguing .	1,053	1,053	3,119	2,398

All the books added to the shelves during the past year and 354 of the more important pamphlets have been catalogued and shelf-listed; and all bound volumes, including periodicals, transactions and reports, have been accessioned.

The Revision of the Catalogue shows that some 680 cards have been revised and re-written.

6,609 unbound pamphlets and reprints have been subject-headed and arranged alphabetically by subject and by author under the subject. The binding of pamphlets by subjects has been delayed on account of conditions arising from the late war and will be still held in abeyance until labor conditions have become more settled.

We have listed November 1, 1919, current periodical publications, including "Transactions" and "Reports" to the number of 1,239, obtained through the following sources:

	American.	Foreign.
Endowment Funds	15	230
By purchase from General Account	82	386
In exchange	61	81
Editors	123	24
Publishers	21	2
In addition, current numbers of periodicals have been received, at stated intervals, through the courtesy of the editors and editorial staff of the following journals: American Journal of the Medical Sciences Therapeutic Gazette	57	18
	359	741

The actual number of current periodicals received during the year, including new subscriptions (15 American, 9 Foreign), total 645. The "Reports," 120 American and 19 Foreign, are not included in the figures just mentioned of current periodicals received during the year.

The increase for the year in current periodicals received, 106, is made up, to a great extent, by German and Austrian journals.

With the assistance of the Committee of Importations of the American Library Association we obtained, through one of their appointed foreign Agents current numbers of seventy-nine German and Austrian medical periodicals, out of our total subscription list for this class of journals of two hundred and forty-nine, for the years 1918 and 1919. Since the signing of the armistice direct communication has been opened with Germany and the Library Committee has determined that it would be advisable to stop all subscriptions obtained through the foreign Agent of the American Library Association, with the end of the current year and continue, as heretofore, through New York. From the figures just mentioned it will be seen that while we have received quite a large number of German periodicals for the years 1918 and 1919, representing, possibly, the more important issues, yet the entire number does not represent one-third of our subscriptions to the journals issued in the countries closed to us by the late war. It is very important therefore that we get in touch with these countries

at once and endeavor to fill up the files open since 1915. Through the courtesy of the Library of the Surgeon-General's Office we have obtained a large number of German periodicals from 1915 on, enabling us to complete, in all, sixty-three volumes.

The following is a list of the foreign schools of medicine with which we exchanged publications prior to the war:

University of	Amsterdam	University of	Königsberg
"	Basel	"	Lausanne
"	Berlin	"	Leiden
"	Bern	"	Leipzig
"	Bonn	"	Liège
"	Breslau	"	Lund
"	Erlangen	"	Marburg
"	Geneva	"	Rostock
"	Giessen	"	Strassburg
"	Göttingen	"	Upsala
"	Griefswald	"	Utrecht
"	Halle	"	Würzburg
"	Heidelberg	"	Zurich
"	Keil		

Faculty of	Medicine of	Bruxelles
"	"	Paris
"	"	Toulouse
"	"	Yucatan

We have heard from Basel, Bern, Paris and Toulouse during the past year; 25 dissertations have been added to our collection and 1,221 theses of the Faculté de Médecine de Paris, covering the school years 1913–14 to 1917–18 inclusive, bound in 111 volumes.

We have received in cash from the sale of duplicates for the current year ending November 1, 1919: $381.87.

During the year we have distributed books and journals, on exchange account, to the following:

Boston Medical Library
College of Physicians and Surgeons, New York
Medical Library Association, Exchange Bureau
New York Public Library

And we have received exchanges from:

Boston Medical Library
College of Physicians and Surgeons, New York
Medical Library Association, Exchange Bureau
New York Public Library

With the aid received from exchanges and purchases made with funds appropriated for the purpose by the Library Committee, we have, since November 1, 1918, completed the files of the following journals:

Deutsche Medicinische Presse, Berlin
Journal and Proceedings of the Society for Psychical Research, London
Provincial Medical and Surgical Journal, London

Amount of fines collected from November 1, 1918, to November 1, 1919: $23.65.

The following is a list of the rare medical books and works of special interest received during the past year:

Incunabula

(Total number of incunabula at this date, 252 Titles, 238 Volumes)

Aquinas, Thomas. [Commentarius in libros Aristotelis de anima.] Papiae, Martinus de Lavalle de Monferto, 1488. [Hain 1521.]
Contemporary manuscript notes.
Fund for Rare Books.

Beroaldus, Philippus. [Annotationes in Commentarios Servii in Virgilium.] Bononiae, Henricus de Colonia, 1482. [Hain 2944.]
Bound with—Plinius, Cajus, Secundus. Epistolarum libri IX, 1483.
Fund for Rare Books.

Beroaldus, Philippus. [De felicitate opusculum.]*** Bononiae, Plato de Benedictus, 1495. [Hain-Copinger 2969.]
Rare. Perfect copy.
Fund for Rare Books.

Burley, Walter. [Expositio sive scriptum super artem veterem Porphyrii et Aristotelis.] Venetiis, Christopher Arnold, [Circa 1477]. [Hain 4127.]

First edition. Differs slightly from all recorded copies.

Fund for Rare Books.

Hentisberus, Guilelmus. [Expositio regularum solvendi sophismata.] Venetiis, de Bonetis, 1483. [Hain-Copinger 8441.]

Contemporary manuscript notes.

Fund for Rare Books.

Hugo Senensis. [Expositio in libros tegni Galeni.] Venetiis, Octavianus Scotus per Bonetum Locatellum, 1498. [Hain 9015.]

Fund for Rare Books.

Hugo Senensis. [Tractatus utilissimus circa la conservazione della sanitade.] Mediolani, Petrus de Cornerio, 1481. [Hain 9021.]

Fund for Rare Books.

Leupoldus, Dux Austriae. [Compilatio de astrorum scientia.] Augsberg, Ratdolt, 1489. [Hain-Copinger 10042.]

First edition.

Fund for Rare Books.

Magni, Jacobus. [Zophilogium s. sophologium.] [Parisiis, Felix Balligault for Jean Richart, 1498.] [Copinger 3748.]

Extremely rare edition.

Fund for Rare Books.

Maimonides, Moses. Aphorismi medici. Venetiis, Johannes Hamman de Landovia, 1500. [Not in Hain.]

Only copy in America of this important collection which contains also Abenzohar "De cura lapidis, etc."

Fund for Rare Books.

Nider, Joh. [Tractatus de morali lepra.] [Colon., Zell, circa 1469.] [Hain-Copinger 11814.]

First edition.

Fund for Rare Books.

Petrus de Abano. [Tractatus de remediis venenorum.] [Romae, circa 1473.] [Not in Hain.]

Contemporary manuscript notes.

Fund for Rare Books.

Plinius, Cajus Secundus. [Epistolarum libri IX.] Tarvisi, Johannes Vercellensis, 1483. [Hain 13113.]

*Contains also—Beroaldus, P. Annotationes*** Virgilioni.**** 1482.

Fund for Rare Books.

Poggius, Joh. Franciscus. [Facetiarum liber.] Venetiis, 1487. [Hain 13193.]

F. 1 blank, ff. 41–47 (sign. f) supplied in MSS, additional facetiae on f. 55.

Fund for Rare Books.

Poggius, Joh. Franciscus. Facetiarum liber. [Paris, Le Noir, 1495?] [Copinger 4787.]

Only two other copies of this edition known. According to Census of the Bibliographical Society this is the only copy in America.

Fund for Rare Books.

Regius, [Raphael]. Epistolae Plynii; qua libri naturalis historiae Tito Vespasiano dedicantur; enarrationes. Venetiis, Guillielmus (de Plano) Cereto de Tridino de monteferrato, 1490.

J. Mitford's copy, with his autograph on fly-leaf.

Fund for Rare Books.

Savonarola, [Giovanni] Michele. [De balneis et thermis naturalibus omnibus Italiae.] Ferrariae, Andreas Bellfortis Gallus, 1485. [Hain 14493.]

Contemparary manuscript notes.

Fund for Rare Books.

Torrella Valentinus, Hieronymus. [Opus praeclarum de imaginibus astrologicis.] Valentiae, Alphonsus de Orta, 1496. [Hain-Copinger 15560.]

Only edition of only work by this prominent Spanish physician. Only one other copy in America.

Fund for Rare Books.

Works of Special Interest

Bacon, Francis Lord Verulam. Novum organum scientiarum. 2 Ed. Amstelaedami, Ravensteinii, 1660.

Fund for Rare Books.

Bacon, Francis Lord Verulam. Sylva sylvarum; or, a naturall history. In ten centuries; whereunto is newly added the history naturall and experimentall of life and death, or of the prolongation of life. (The first edition in which this appears.) London, Lee, 1651.

Fund for Rare Books.

Beverland, [Hadrian]. De stolatae virginitatis jure lucubratico academica Lugduni, Lindani, 1680.

First edition. (*Scurrilous work but contains much medical material.*)

Fund for Rare Books.

Blackmore, Sir Richard. Treatise of consumption and other distempers, belonging to the breast and lungs. London, Pemberton, 1724.

First edition.

Fund for Rare Books.

Borrichius, Olaus. Hermetis aegyptiorum et chemicorum sapientia ab Hermanni Conringii animadversionibus vindicata. Hafniae, Hauboldi, 1674.

First edition.

Fund for Rare Books.

Briggs, Guilielmus. Nova visionis theoria, regiae societati Londin. proposita. Editio altera.

*Bound with his—Ophthalmo-graphia.**** 1676.

Presented by George W. Norris, M.D.

Briggs, Guilielmus. Ophthalmo-graphia, sive oculi ejusque paetium descriptio anatomica. Cantabrigiae, Hayes, 1676.

*Contains also his—Nova visionis.**** 1685.

Presented by George W. Norris, M.D.

B[ulwer], J[ohn]. Pathomyomotomia, or a dissection of the significative muscles of the affections of the minde. Being an essay to a new method of observing the most important movings of the muscles of the head as they are the neerest and immediate organs of the voluntarie or impetuous motions of the mind. With a proposal of a new nomenclature of the muscles. London, Moseley, 1649.

Extremely rare and curious treatise on the influence of the mind over the muscles.

Fund for Rare Books.

Capelle, Johann Simon. De febre continua epidemia, Brandenburgi Marchicorum anno superiore observata.*** Frankfort-on-Oder, Coepsel, 1695.

Extremely rare dissertation printed in a small town on the Prussian-Polish frontier.

Fund for Rare Books.

Cardanus, Hieromymus. Libelli quinq[ue], quorum duo priores, jam denuo sunt emendati duo sequentes jam primum in lucem editi, et quintus magna parte auctus est. Norimbergae, Petreius, 1547.

Fund for Rare Books.

de Chaves, Hieronimo. Chronographia; o, Reportorio de tiempos, el mas copioso y precisso que hasta ahora ha salido a luz.*** Sevilla, Diaz, 1584.

Excessively rare second edition of an important work.

Fund for Rare Books.

Crollius, Oswald. Basilica chymica; oder, Alcymistisch Königlich Kleynod.*** Franckfuhrt, Tampachen [1622].

First German edition.

Fund for Rare Books.

Daran, James. Chirurgical observations on the disorders of the urethra. Translated into English by Thomas Tomkyns, with the addition of some remarkable cases. London, Millar, 1750.

Fund for Rare Books.

Deane, Edmund. Spadacrene Anglica; or, the English spaw-fountaine. Being a brief treatise of the acide, or tart fountaine in the forest of Knaresborow, in the West-Riding of Yorkshire. As also a relation of other medicinall waters in the said forest. London, Grismand, 1626.

Fund for Rare Books.

Douglas, John. Lithotomia Douglassina; or, A new method of cutting for the stone. London, Rivington, 1723.

Presented by George W. Norris, M.D.

Draudius, Georgius. Bibliotheca classica; sive catalogus officinalis in quo singuli singularum facultatem ac professionum libri.*** Frankfort, Saurius, 1611.

Important bibliography, very early for medical bibliography, which contains many works the existence of which we only know from this volume. Vallee, 2080. *Inscription on title—Ex libri Thomae Plateri,* 1615; *perhaps a son of Felix Platter, famous physician,* 1536-1614.

Fund for Rare Books.

Fern, Thomas. Perfect cure for the King's evil (whether hereditary or accidental) by effectual alcalious medicines; faithfully approv'd by the experiences of eighteen years' practice, and the patients restor'd beyond relapse. London, Browne, 1709.

First edition. From the Library of Col. Coles, Pitchford Hall, Salop, with his book-plate dated 1755.

Fund for Rare Books.

Fracastorius, Hieronymous. Della sifilide; ovvero del morbo gallico*** libri III, volgarizzati da Vincenzo Benini.*** Bologna, dalla Volpe, 1765.

Fund for Rare Books.

de Francini, Sieur Horace. Hippiatrique; où est traité des causes des maladies du cheual tant interiures qu'exteriures; le moyen de la guarir d'icelles; ensemble de la bonté et qualité d'iceluy. Paris, Orry, 1607.

Deposited by A. P. Francine, M.D.

Glauber, Joh. Rudolf. De auri tinctura sive auro potabili vero; quid sit et quommodo differat ab auro potabili falso et sophistico quomodo spagyrice praeparandum et quomodo in medicina usurpandum. Amsterodami, Janssonius, 1651.

Extremely rare first Latin edition.

Fund for Rare Books.

Glauber, Joh. Rudolf. Operis mineralis***item; Panacea sive medicina universalis antimonialis.*** Amsterodami, Janssonius, 1651.

First Latin edition. The title is very misleading as these three volumes are treatises on chemistry and medicine.

Fund for Rare Books.

Guidott, Thomas. De thermis Britannicis tractatus.*** Londini, Leach, 1691.

Fund for Rare Books.

Harvey, William. Exercitationes de generatione animalium. Quibus accedunt quaedam de partu; de membranis ac humoribus uteri; et de conceptione. Amstelodami, Elzevir, 1651.

Genuine first edition, of which there were counterfeits by Jansson and Ravesteyn.—S. Weir Mitchell.

Fund for Rare Books.

Herring, Francis. Certaine rules, directions, or advertisements for this time of pestilentiall contagion; with a caveat to those that weare about their necks impoisoned amulets as a preservative from the plague; first published for the behoofe of the city of London, in the last visitation, 1603.*** London, Jones, 1625.

Fund for Rare Books.

Herring, Fr[ancis]. Modest defence of the caveat given to the wearers of impoisoned amulets as preservatives from the plague; wherein that point is somewhat more largely reasoned and debated with an ancient physician, who hath maintained them by publicke writing.*** London, Hatfield, 1604.

Fund for Rare Books.

Hippocrates. Aphorismi, cum Galeni commentariis, Nicolao Leoniceno, interprete. Venetiis, 1538.

Contains also—Leonicenus, N. Galeni ars medicinalis. 1598.

Fund for Rare Books.

Hippocrates. Aphorisms. MS. Translation [by George Sharswood]. [Phila., 1830.]

Contains—Letter dated April 26, 1830, from George Sharswood to G. W. Norris, M.D., at whose request he had undertaken the translation.

Presented by George W. Norris, M.D.

Hobbes, Thomas. Elementorum philosophiae sectio secunda, de homine. T. C. for a Crooke. London, 1658.

Rare. This led to a 20 years' controversy between Hobbes and Wallis.

Fund for Rare Books.

Hooke, Robert. Micrography; or, some physiological descriptions of minute bodies made by magnifying glasses, with observations and inquiries thereupon. London, Marytn, 1667.

First edition.

Fund for Rare Books.

Jackson, James. A Memoir of James Jackson, Jr., M.D., with extracts from his Letters to his Father; and Medical Cases collected by him. Boston, Butts, 1835.

Contains the autograph inscription of Louis to Oliver Wendell Holmes and the autograph of Holmes to John D. Jackson. Also Dr. Lewis S. McMurtry's autograph inscription to the College of Physicians of Philadelphia.

Presented by Dr. McMurtry through the courtesy of Dr. W. W. Keen.

Jonston, John. History of the constancy of nature. London, Streater, 1657.

Rare.

Fund for Rare Books.

Kephale, [Richard]. Medela pestilentiae; wherein is contained several theological queries concerning the plague, with antidotes, signs and symptomes, also an exact method for curing that epidemical distemper. London, Speed, 1665.

Fund for Rare Books.

Knutsson, Bengt. A litil boke the whiche traytied and reherced many gode hinges necessaries for the*** pestilence*** made by the *** Bisshop of Arusiens*** [London], [1485?] Manchester, University Press, 1910.

Reproduced in facsimile from the copy in the "John Rylands" Library. With an introduction by Guthrie Vine.

Fund for Rare Books.

Koch und Kellerey von allen speisen unnd geträncken viel güter heimlicher Künste. Auch wie mann Lacwergen, Confect, Conserven und einbeitzung machen soll vonn mancherly Früchten, Blümen, Kreuten, unnd Würtzelen. Einem jeden im Hauss sehr Nützlich zü gebrauchen. Franchfurdt am Mayn, Gulfferich, 1545.

Presented by George W. Norris, M.D.

de La Gresie, [Cyprien] Bertrand. Essai sur le traitement des dartres avec un recueil d'observations qui demontrent l'efficacité de l'extrait de douceamère pour la guérison de cette maladie. Paris, Didot, 1784.

Fund for Rare Books.

Le Clerc, Daniel. History of physic; or, An account of the rise and progress of the art, and the several discoveries therein from age to age. With remarks on the lives of the most eminent physicians. Written originally in French and made English by Drake and Baden. With additional notes. London, Brown, 1699.

Presented by George W. Norris, M.D.

Le Febvre, N[icholaus]. Discourse upon Sr. Walter Rawleigh's great cordial rendred into English by Peter Belon. London, Pulleyn, 1664.

Fund for Rare Books.

Lygaeus, Joannes. De humani corporis harmonia. Libri IIII Doctiss[imis] annotationibus et scholiis in physiologiae studiosorum gratiam illustrate. Lutetiae, Vascosanus, 1555.

Rare first edition of a little known work. Very interesting as it was written at the time when Vesalius created a revolution in anatomy. The author, in preface, even uses as the title Vesalius' expression "Corporis humani fabrica."

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Major, John. In Petri Hyspani summulas commentaria.*** Termini magistri Ioannis maioris.*** Argumenta sophistica. Venice, Lazarus de Soardis, 1506.

Very rare second edition.

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de Monte Synders, J[oh.]. Commentatio de pharmaco catholico. (A Latin translation of De Medicina Universali.) Amsterdam, Seyerstrat, 1678.

Extremely rare edition of a Latin translation of a well known German treatise, published for the first time in 1666.

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de Necker, N[oel] Joseph. Physiologia muscorum per examen analyticum de corporibus variis naturalibus inter se collatis continuitatem proximamue animalis cum vegetabili concatenationem indicantibus. Manhemii, Schwan, 1774.

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Petronius, Alexander Trajanus. De victus romanorum et de sanitate tuenda libri quinque. His accessere libelli duo. De aluo sine medicamentis mollienda. Romae, Sterlich, 1581–1582.

First edition of the earliest treatise on hygiene and food of the Romans.

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Peucer, Casparus. Commentarius de praecipvis divinationum generibus, in quo a prophetiis, authoritate diuina traditis.*** Frankfurti, Wecheli, 1593.

Very rare and interesting work. First edition was printed in 1591.

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Praevotius, Joannes. Artem componendi medicamenta genuinae restitut integritati exhibet. Amstelodami, apud Elzevirium, 1665.

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Quattrami da Gubbio. La vera dichiaratione di tutte le metafore, similitudini [e] enimmi de gl'antichi filosofi alchimisti, tanto Caldei [e] Arabi, come Greci [e] Latini, usati da loro nella descrittione [e] compositione dell'oro potabile, elissire della vita, quinta essenza [e] lapis filosofico. Rome, Accolti, 1587.

The present work is devoted more to an exposure of the deception of the spurious alchemists than to chemical preparations.

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Rambaldus [J.], Jr. Compendiaria tractatio de febris quidditae iuxtà veterum, et recentiorum placit.*** Genvae, Franchelli, 1690.

Very rare first edition.

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Regimen sanitatis. §Diss ist das Regiment der gesuntheyt durch all monat des gantzen iars man sich halten sol mit essen un[d] trincken. *** Augsbuerg, Froschauer, 1502.

Extremely rare edition of a famous work.

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Remigius, Nicolaus. Daemonolatreiae libri tres.*** Lugduni, in officina Vincentii, 1595.

Fund for Rare Books.

Restaurant, Raymond. Hippocrates De natura lactis et de usu in curationibus morborum. Aravsioni, tip. calc. Celsi. Uniuersitatis, 1667.

Fund for Rare Books.

de Rochas [d'Aiglum], Henry. De la peste, pourore, rougeole, petite verole, et autres maladies veneneuses recogneuës par leurs causes, et guaries par leurs remedes specifiques. Paris, 1600.

Fund for Rare Books.

Russel, William. Physical treatise, grounded, not upon tradition, nor phancy, but experience, consisting of three parts. First, A manuduction discovering the true foundation of the art of medicine. Second, An explanation of the general natures of diseases. Third, A proof of the former position by practice. London, Williams, 1685.

Fund for Rare Books.

Saalmann, Ferd[inand]. Descriptio rheumatismi acuti et dilucidatio ducentorum et quinquaginta aphorismorum Hippocratis ad rheumatismum tum acutum tum cronicum.*** Monasterii, Perrenon, 1789.

Rare monograph printed in a small town.

Fund for Rare Books.

Schott, Gaspar. Technica curiosa; sive, Mirabilis artis, libris XII. comprehensa.*** Würzburg, Hertz, 1664.

Contains descriptions of many inventions by Doctors Boyle, Kircher, de Nigro, Ponte and others.

Fund for Rare Books.

Sputonus, Joannes Baptista. Con-echidne-logia hoc est pulveris viperini discursus.*** Papiae, Magrii, 1643.

Fund for Rare Books.

Swalve, Bernhardus. Alcali et acidum; sive naturae et artis instrumenta pugilica, per Neochmum et Palaephatum hinc inde ventilata, et praxi medicae superstructae praemissa. Amstelodami, Jansson, 1670.

Fund for Rare Books.

Tauvri, [Daniel]. Pratique des maladies aigues et de toutes celles qui dependent de la fermentation des liquers. Paris, d'Houry, 1713.

Fund for Rare Books.

Thayer, Thomas. Treatise of the pestilence; wherein is showed all the causes thereof, with most assured preseruatiues against all infection; and lastly is taught the true and perfect cure of the pestilence, by most excellent and approved medicines. London, Short, 1603.

Fund for Rare Books.

Turner, Daniel. Remarkable case in surgery; wherein an account is given of an uncommon fracture of the skull, in a child about six years old; accompanied with a large abscess or aposteme upon the brain.*** London, Parker, 1709.

Fund for Rare Books.

Vegio [Maffeo] da Lodi. Disputatio inter solem, terram et aurum. Paris, Remboldt, 1511.

Very rare first separate edition of an interesting work of great alchemical interest.

Fund for Rare Books.

Vitellio. Id est de nature, ratione, et projectione radiorum visus, luminum, colorum atque, formarum, qua vulgo perspectivam vocant. Libri X.*** Georgii Tanstetter et Petri Apiani in lucem aedita. Norimbergae, Petreius, 1535.

Earliest European work on "Optics." Editio princeps of one of the greatest mathematicians of the 13th century.

Fund for Rare Books.

Vratislaviensis, Michael. Introductorium astronomie Cracoviensis elucidans almanach. Cracow, Ulger, 1513.

Second edition, of great rarity.

Fund for Rare Books.

Manuscripts

Goodell, William. Notes, abstracts and memoranda 1856–1889. [Phila., 1856–1889.]

Presented by the Estate of W. C. Goodell, M.D.

[Norris, George Washington]. Clinical notes on cases seen at the Douglas Hospital, at Washington, D. C., during the Civil War. [Washington, 1861–1865.] Presented by George W. Norris, M.D.

Norris, George Washington. Record of private surgical practice and operations. [Phila., 1835–1843.]

Presented by George W. Norris, M.D.

Pathological Society of Philadelphia. Articles of incorporation and list of members. [Phila., 1857.]

Presented by George W. Norris, M.D.

Very interesting XVIIth and XVIIIth Centuries English MS. Folio collection of medical and other recipes. Contains book-plate of Strickland Freeman, Esq., Fawley Court, Bucks 1810.

Fund for Rare Books.

Other Interesting Additions

Member's badge of the American Medical Association, 1919, presented by Dr. W. W. Keen.

Member's badge of the Congress of American Physicians and Surgeons, 1919; also badge of the "Medical Veterans of the World War," 1919, presented by Dr. A. Parker Hitchens.

Japanese medicine-case of lacquered wood, presented by Dr. A. P. C. Ashhurst.

We have also received during the year a number of interesting and more or less valuable autograph letters.

The Photostat has been in operation on the stated days, Wednesday and Friday, for the same period as during the preceding year.

There have been furnished to Fellows and others, on application, 200 prints. The work for the Library has been continued according to the original instructions of the Committee. 7296 large and small prints have been made and 30 volumes of incunabula completed, making a total of 101 photostat copies of incunabula to date. In addition, a photostat copy was made of the first edition of Harvey—"De motu cordis et sanguinis," 1628, it is to be used for exhibition instead of the original.

During the year there has been a decrease in the number of new publications received: 93.

The following table is of interest, as it shows the variation in the number of new books received for the past five years, about covering the entire period of the unsettled conditions caused by the war. An order was sent direct, in the early part of September, for more than one hundred books published in Germany during the past five years; trusting that they would be received in time for this report, but such has not been the case:

	1919.	1918.	1917.	1916.	1915.
United States	357	506	456	425	283
Great Britain	164	154	121	161	100
France	152	96	144	15	8
Germany	...	4	20	90	175
Other countries	14	10	23	43	8
	687	780	764	734	574

The additions to the principal of the Library Endowment Funds during the past year amount to: $29,428.42, making a total at this date of $357,287.34.

It is gratifying to note the increase in the number of journals—so much diminished during the war—received in the current year. This fact is in keeping with the gradual return to more normal conditions. An increase, though not a large one, is also noted in the use of the Library.

The Library Committee feel that the College should be notified that within a comparatively short time, say within five years, a

seventh tier will have to be erected in the book-stacks; the approximate estimate of the cost at this time as given by the builders, Snead and Company Iron Works, Jersey City, New Jersey, is $16,883. This amount may of course be somewhat increased or lowered according to conditions at the time the additional stack is erected. It is perhaps advisable that some arrangement should now be made to accumulate the funds necessary to meet this expense.

It is with much sorrow, that the Library Committee, reports officially the loss of the former Honorary Librarian, Dr. Frederick P. Henry, whose death occurred May 24, 1919. A memoir of Dr. Henry has been read at a former meeting of the College and his portrait, presented by his family, now hangs in the Ashhurst room.

LIBRARY COMMITTEE,
FRANCIS X. DERCUM, M.D.,
Chairman.

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